Service Manual

INKEL P.A

MA-320/420/620/920

Power Amplifier

INKEL

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Electrical Adjustment Procedure (MA-320/420/620)

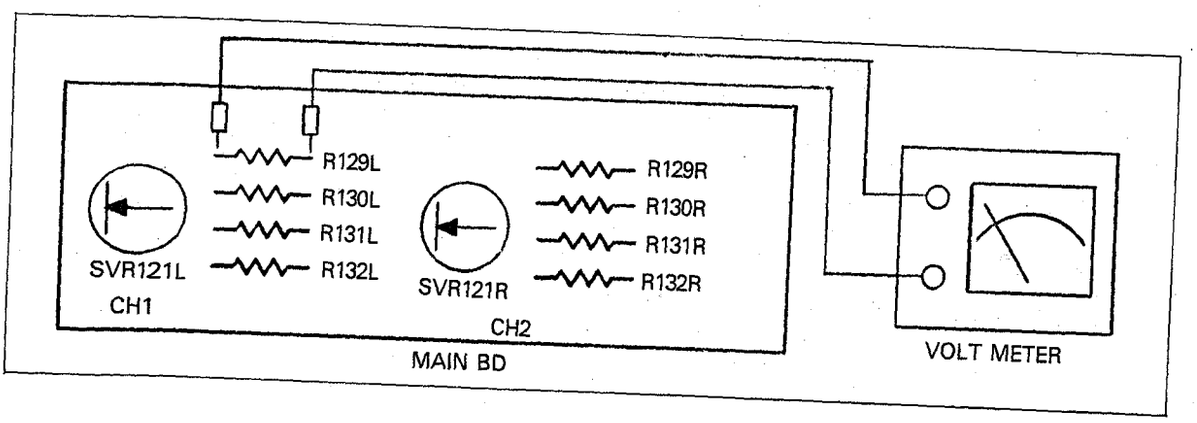
* AMP SECTION

1. IDLE CURRENT

A. SETTING

Set the channel volume minimum.

B. CONNECTION



C. ADJUSTMENT

- Adjust SVR121L so that the current through the R129L, R130L, R131L, R132L become 10 milliampere.
- When the voltage across the resistor become 2.7 millivolt, the current become 10 milliampere.
- The adjust procedure of channel 2 is the same method as channel 1.

2. OFF SET VOLTAGE

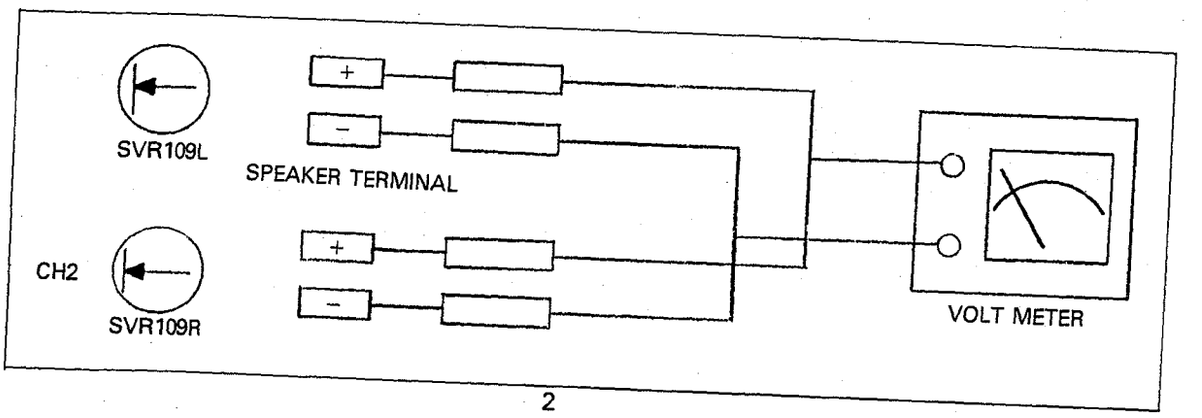
A. SETTING

Set the channel volume controls minimum.

B. CONNECTION

C. ADJUSTMENT

- Control SVR109L until voltimeter is up to the "0" position.
- The adjust procedure of channel 2 is the same method as channel 1.



Electrical Adjustment Procedure (MA-920)

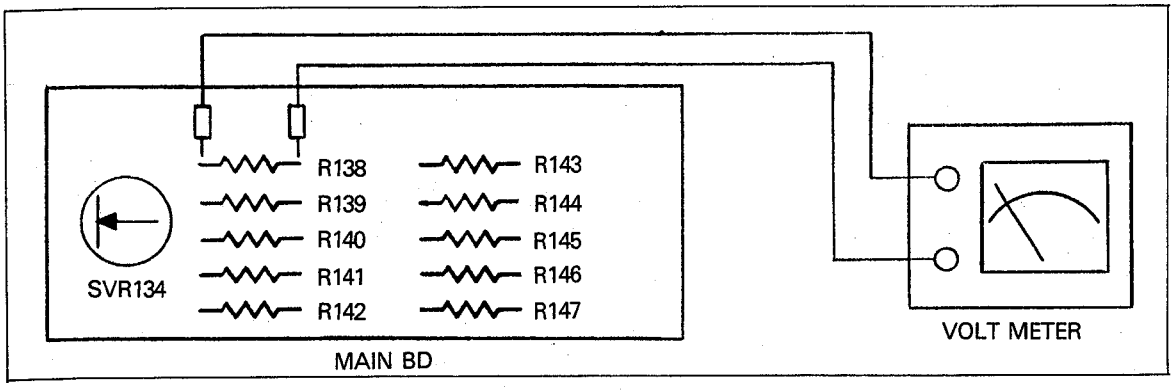
* AMP SECTION

1. IDLE CURRENT

A. SETTING

Set the channel volume minimum.

B. CONNECTION



C. ADJUSTMENT

- Adjust SVR134 so that the current through the R138, R139, R140, R141, R142, R143, R144, R145, R146, R147 become 10 milliampere.
- When the voltage across the resistor become 10 millivolt, the current become 10 milliampere.
- The adjust procedure of channel 2 is the same method as channel 1.

2. OFF SET VOLTAGE

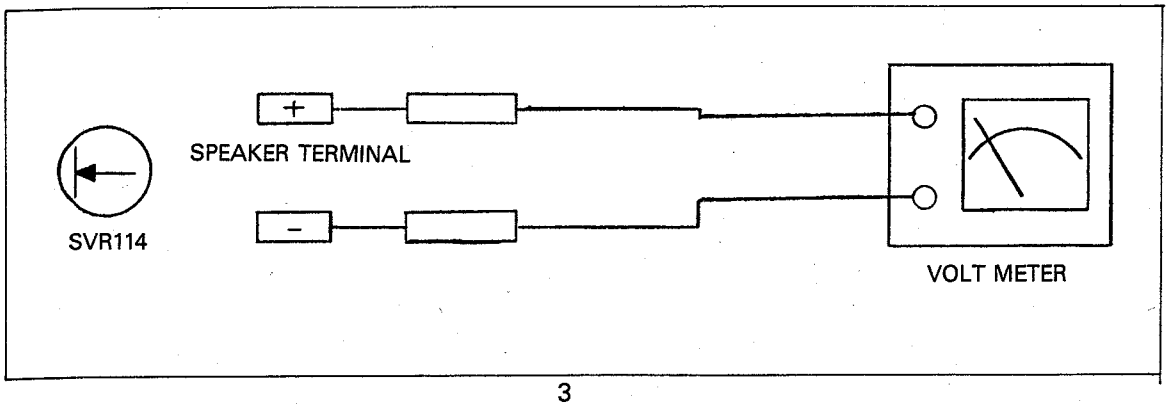
A. SETTING

Set the channel volume controls minimum.

B. CONNECTION

C. ADJUSTMENT

- Control SVR114 until voltimeter is up to the "0" position.
- The adjust procedure of channel 2 is the same method as channel 1.



Specifications (MA-320)

- **GENERAL**

Dimensions	89(H) × 483(W) × 385(D) mm
Weight (Net)	11 Kg

- **ELECTRICAL**

TEST ITEM	Nominal
Rated Output Power Before Clipping	
At 4 ohm (Full Load)	100 Watt
At 8 ohm Bridged Mono	150 Watt
Input Sensitivity	0.775V
Frequency Response (±1dB)	20 – 20KHz
Total Harmonic Distortion	
4 ohm Rated Power (1KHz)	0.05% (20Hz-20KHz)
(10KHz)	
(100KHz)	
Signal to Noise Ratio (30KHz LPF)	105dB (Input Short)
Idle Current	6-30mV
DC Offset Voltage	0 ± 50mV
Channel Separation (at 1KHz)	80dB
Peak Indicator Output Sensitivity	Clipping +1.5dB, −0.5dB
Relay Protection Offset Voltage At Output Terminal	±6V DC

Specifications (MA-420)

- **GENERAL**

Dimensions	89(H) × 483(W) × 385(D) mm
Weight (Net)	12 Kg

- **ELECTRICAL**

	Nominal
Rated Output Power	
8 ohm PER Channel (THD 0.03% AT 1KHz)	100 Watt
8 ohm Bridged Mono	300 Watt
4 ohm Per Channel (THD 0.04% AT 1KHz)	150 Watt
Input Sensitivity	0.775V
Input Impedance	15 Kohm
Frequency Response (±1dB)	20 – 20KHz
Total Harmonic Distortion	
8 ohm Rated Power (AT 1KHz)	0.05%
(AT 10KHz)	
(AT 100Hz)	
4 ohm Rated Power (AT 1KHz)	0.05%
(AT 10KHz)	
(AT 100Hz)	
Signal to Noise Ratio Weighted (30K LPF)	105dB
Idle Current	6-30mV
DC Offset Voltage	0 ± 50mV
Peak Indicator Output Sensitivity	Clipping +1.5dB, −0.5dB
Relay Protection Offset Voltage At Output Terminal	±6V
Channel Separation	80dB MIN

Specifications (MA-620)

- **GENERAL**

Dimensions	133(H) × 483(W) × 385(D) mm
Weight (Net)	17.5 Kg

- **ELECTRICAL**

	Nominal
Rated Output Power	
8 ohm PER Channel (THD 0.3% AT 1KHz)	200 Watt
8 ohm Bridged Mono	450 Watt
4 ohm Per Channel (THD 0.04% AT 1KHz)	300 Watt
Input Sensitivity	0.775V
Input Impedance	15 Kohm
Frequency Response (±1dB)	20 – 30KHz
Total Harmonic Distortion	
8 ohm Rated Power (AT 1KHz)	0.03%
(AT 10KHz)	
(AT 100Hz)	
4 ohm Rated Power (AT 1KHz)	0.04%
(AT 10KHz)	
(AT 100Hz)	
Signal to Noise Ratio Weighted (30K LPF)	105dB
Idle Current	6-30mV
DC Offset Voltage	0 ± 50mV
Peak Indicator Output Sensitivity	Clipping ı 1.5dB, 0.5dB
Relay Protection Offset Voltage At Output Terminal	⊥ 6V DC
Channel Separation	80dB

Specifications (MA-920)

- **GENERAL**

Dimensions	133(H) × 483(W) × 385(D) mm
Weight (Net)	21.5 Kg

- **ELECTRICAL**

TEST ITEM	Nominal
Rated Output Power Before Clipping	
8 ohm Per Channel (THD 0.03% at 1KHz)	300 Watt
8 ohm Bridged Mono	800 Watt
4 ohm Per Channel (THD 0.03% at 1KHz)	450 Watt
Input Sensitivity	0.775V
Input Impedance	15 Kohm
Frequency Response	20 – 20KHz
Total Harmonic Distortion	
8 ohm Rated Power (at 1KHz)	0.03%
8 ohm Rated Power (at 10KHz)	
8 ohm Rated Power (at 100KHz)	
4 ohm Rated Power (at 1KHz)	
4 ohm Rated Power (at 10KHz)	
4 ohm Rated Power (at 100KHz)	
Signal to Noise Ratio Weighted (30K LPF)	105dB
Idle Current	6-30mV
DC Offset Voltage	0 ± 50mV MAX
Peak Indicator Output Sensitivity	Clipping + 1.5dB, − 0.5dB
Relay Protection Offset Voltage At Output Terminal	± 6V DC
Channel Separation	91dB
Residual Noise	80dB

Electrical Parts List (MA-320)

PRODUCT SAFETY NOTICE: If you replace any of these components, carefully read the product safety notice of this manual. Don't degrade the safety of the product through improper servicing.
Remark meaning for version, therefore refer to power requirement of specifications in this manual.

Ref. No.	Part No.	Description	Q'ty	Remarks
Main P.C. Board 4005115603				
Transistors				
Q101L/101R Q102L/102R Q103L/103R Q104L/104R	2008606108-T	TR NPN KTC 2240BL (KTC 3200 BL)	8	
Q105L/105R Q106L/106R	2028107984	TR PNP 2SA 1306A(Y) KTA 1659A(Y)	4	
Q107L/107R Q108L/108R	2028407990	TR NPN 2SC 3298A(Y) KTC 4370A(Y)	4	
Q109L/109R	2008606108-T	TR NPN KTC 2240BL (KTC 3200BL)	2	
Q110L/110R	2028407118	TR NPN 2SC 2238Y	2	
Q111L/111R	2028107115	TR PNP 2SA 968Y	2	
Q112L/112R	2008606104-T	TR NPN KTC 3198Y	2	
Q113L/113R	2008606105-T	TR PNP KTA 1266Y	2	
Q114L/114R	2028107106	TR PNP 2SB 688(O)/WACC	2	
Q115L/115R	2028407109	TR NPN KTD 718(O)	2	
Q116L/116R	2028107106	TR PNP 2SB 688(O)/WACC	2	
Q117L/117R	2028407109	TR NPN KTD 718(O)	2	
Diodes				
D101L/101R D102L/102R	2058010101	Diode IN 60	4	
D103L/103R D104L/104R D105L/105R D106L/106R D107L/107R D108L/108R	2058304100	Diode IN 4148	12	
Resistors				
R101L/101R	3009152973	RES CF 1.5K 1/5W JN	2	
R102L/102R	3039153472-F	RES MO 15K 1W J	2	
R103L/103R R104L/104R	3009271973	RES CF 270 1/5W JN	4	
R105L/105R	3039153472-F	RES MO 15K 1W J	2	
R106L/106R		Not Used!		
R107L/107R	3009473973	RES CF 47K 1/5W JN	2	
R108L/108R		Not Used!		
R109L/109R		Not Used!		
R110L/110R R111L/111R	3009102973	RES CF 1K 1/5W JN	4	
R112L/112R R113L/113R R114L/114R	3009103973	RES CF 10K 1/5W JN	6	
R115L/115R	3009561973	RES CF 560Ω 1/5W JN	2	
R116L/116R	3009680973	RES CF 68 1/5W JN	2	
R117L/117R	3039103472-F	RES MO 10K 1W JN	2	
R118L/118R R119L/119R	3009221973	RES CF 220 1/5W JN	4	
R120L/120R R121L/121R	3009152973	RES CF 1.5K 1/5W JN Not Used!	2	
R122L/122R	3009152973	RES CF 1.5K 1/5W JN	2	
R123L/123R	3009203973	RES CF 20K 1/5W JN	2	
R124L/124R	3039271472-F	RES MO 270 1W J	2	
R125L/125R R126L/126R	3009103973	RES CF 10K 1/5W JN	4	
R127L/127R R128L/128R	3009221973	RES CF 220 1/5W JN	4	
R129L/129R R130L/130R R131L/131R R132L/132R	3059278782	RES CF 0.27 5W JN	8	
R133L/133R		Not Used!		
R134L/134R		Not Used!		
R135L/135R	3039479572-F	RES MO 4.7 2W JN	2	
R136L/136R	3009561973	RES CF 560 1/5W JN	2	
R137L/137R	3009103973	RES CF 10K 1/5W JN	2	
R138L/138R	3039100683	RES MO 10 3W W/COIL	2	
R139L	3009102973	RES CF 1K 1/5W JN	1	
Variable Resistors				
SMVR109L/109R SMVR121L/121R	3248347120	RES SEMI CS 470B 10/5W	4	
Capacitors				
C101L/101R	3509821130-T	CAP CE B 820PF 50V K	2	
C102L/102R	3409210071-T	CAP AF RSG 10UF 50V	2	
C103L/103R	3409847041-T	CAP AF NP 47UF 25V	2	
C104L/104R	3509470130-T	CAP CE SL 47PF 50V J	2	
C105L/105R		Not Used!		
C106L/106R	3409847041-T	CAP AF NP 47UF 25V	2	
C107L/107R	3509102530-T	CAP CE B 0.001UF 50V K	2	
C108L/108R	3409210071-T	CAP AF RSG 10UF 50V	4	
C109L/109R				
C110L/110R C111L/111R C112L/112R	3509101130-T	CAP CE SL 100PF 50V J	6	
C113L/113R	3609104120-T	CAP MA 0.1UF 100V J	2	
C114L	3509473530-T	CAP CE F 0.047UF 50V Z	1	
Connectors				
	4428596602	Con Wafer LW-1143-02P	2	
	4428596603	Con Wafer LW-1143-03P	1	
	4428598305	Con Wafer LW-0640-5P	2	
	4428598304	Con Wafer LW-0640-4P	1	
	4428595002	Con Wafer LW-5267-2P	1	
Others				
	5508223330	Fuse NB 31.8mm 5A/250V KS	2	
Input P.C. Board 4005115610				
IC				
IC201	2118010232	IC TL-072N (NJM) JRC	1	
Diodes				
ZD201/202	2058510150	Diode Zener UZP-15B (13.9, 15.9)	2	

Ref. No.	Part No.	Description	Q'ty	Remarks
Resistors				
R201L/201R	3009472973	RES CF 4.7K 1/5W JN	4	
R202L/202R				
R203L/203R	3009472973	RES CF 4.7K 1/5W JN	2	
R204L/204R	3009472973	RES CF 4.7K 1/5W JN	2	
R205/206	3009272973	RES CF 2.7K 1/5W JN	2	
R207L/207R	3009474973	RES CF 470K 1/5W JN	2	
R208/209	3039222572-F	RES MO 2.2K 2W JN	2	
Capacitors				
C201L/201R	3409847041-T	CAP AF NP 47UF 25V	4	
C202L/202R				
C203L/203R	3509509030-T	CAP CE SL 5PF 50V J	2	
C204L/204R	3509101130-T	CAP CE SL 100PF 50V J	4	
C205L/205R				
C206L/206R		Not Used!		
C207L/207R		Not Used!		
C208/209	3409247071-T	CAP AF RSG 47UF 50V	2	
C210L/210R	3409847041-T	CAP AF NP 47UF 50V	2	
Connectors				
	4428594902	Con Wafer LA-5268-2P	2	
	4428598705	Con Wafer LA-0640-5P	1	

Power Supply P.C. Board 4005115651

Ref. No.	Part No.	Description	Q'ty	Remarks
Transistors				
Q501-506	2008606108-T	TR NPN KTC 2240BL	6	
Diodes				
ZD502	2058502240	Diode Zener UZ-24BM	1	
Resistors				
R501	3009153973	RES CF 15K 1/5W JN	1	
R502	3009122973	RES CF 1.2K 1/5W JN	1	
R503	3009153973	RES CF 15K 1/5W JN	1	
R504	3009473973	RES CF 47K 1/5W JN	1	
R505	3009333973	RES CF 33K 1/5W JN	1	
R506	3009100973	RES CF 10 1/5W JN	1	
R507/508	3009472973	RES 4.7K 1/5W JN	2	
R509	3009473973	RES CF 47K 1/5W JN	1	
R510	3009154973	RES CF 150K 1/5W JN	1	
R511	3009333973	RES CF 33K 1/5W JN	1	
R512/513	3009123973	RES CF 12K 1/5W JN	2	
R514/515	3009683973	RES CF 68K 1/5W JN	2	
Capacitors				
C503	3409222141-T	CAP AF RSG 220UF 25V J	1	
C504	3609104120-T	CAP MA 0.1UF 100V J	1	
C507	3408210231	CAP RSA 1000UF 16V SNAP	1	
	3419568280	CAP AF HM 6800UF 63V	2	
Others				
RELAY	5528009980	Relay HR-311	1	
Connectors				
	4428596604	Con Lock Wafer LW-1143-04P	1	
	4428596603	Con Lock Wafer LW-1143-03P	1	
	4428595002	Con Wafer LW-5267-2P	3	
	4428598303	Con Wafer LW-0640-3P	1	

Ref. No.	Part No.	Description	Q'ty	Remarks

Volume P.C. Board 4005115620

Resistors				
R301L/301R	3009123973	RES CF 12K 1/5W JN	2	
R302L/302R	3009563973	RES CF 56K 1/5W JN	2	
Capacitors				
C301L/301R	3609104120-T	CAP MA 0.1UF 100V J	2	
Connectors				
	4428598707	Con Wafer LA-0640-7P	1	
	4428598705	Con Wafer LA-0640-5P	1	
Connector Lead Ass'ies				
	4428599020	T187 Terminal Housing (0.5T)	2	
	4355468916	Socket Wire Ass'y (360mm)	2	
	4355468910	Socket Wire Ass'y (210mm)	1	
	4355979110	Con Ass'y (Power)	1	
	4355981110	Con Ass'y Output	1	
	4355981120	Con Ass'y Output	1	
	4355981610	Con Ass'y CH1 Input	1	
	4355981510	Con Ass'y (Volume)	1	
	4355981011	Con Ass'y 7P	1	
	4365999010	Lug Terminal 187	1	
	4355981211	Con Ass'y 2P Power LED	1	
	4355981310	Con Ass'y 3P (280mm)	1	
	4408198610	Terminal Ass'y 2P	2	
	4355961811	Con Ass'y 2P	1	
	4355981411	Con Ass'y 2P	1	
	4465999010	Lug Terminal 187	2	
Ass'y Chassis Mounting				
	2828084111	Power Transformer	1	
	5508223430	Fuse NB 31.8mm 6A/250V KS	1	B, C, D
	5508222930	Fuse NB 31.8mm 3A/250V UL/CSA	1	A
Power LED	2308252222	LED REF SLR-54UR R5 RED ROHM	1	
Protection	2308958352	LED T-Color SPR-54mww R5 M.WHI	1	
Clip	2308252222	LED REF SLR-54UR RED ROHM	2	
	4678699800	Thermo Switch T95AR IVI	2	

Electrical Parts List (MA-420)

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Remark meaning for version, therefore refer to power requirement of specifications in this manual.

Ref. No.	Part No.	Description	Q'ty	Remarks
Main P.C. Board 4005115603				
Transistors				
Q101L/101R	2008606108-T	TR NPN KTC 2240BL (KTC 3200 BL)	8	
Q102L/102R				
Q103L/103R				
Q104L/104R				
Q105L/105R	2028107984	TR PNP 2SA 1306A(Y) KTA 1659A(Y)	4	
Q106L/106R				
Q107L/107R	2028407990	TR NPN 2SC 3298A(Y) KTC 4370A(Y)	4	
Q108L/108R				
Q109L/109R	2008606108-T	TR NPN KTC 2240BL (KTC 3200BL)	2	
Q110L/110R	2028407118	TR NPN 2SC 2238Y	2	
Q111L/111R	2028107115	TR PNP 2SA 968Y	2	
Q112L/112R	2008606104-T	TR NPN KTC 3198Y	2	
Q113L/113R	2008606105-T	TR PNP KTA 1266Y	2	
Q114L/114R	2028107108	TR PNP 2SB 1429(O)/WACC	2	
Q115L/115R	2028407112	TR NPN 2SD 2155(O)	2	
Q116L/116R	2028107108	TR PNP 2SB 1429(O)/WACC	2	
Q117L/117R	2028407112	TR NPN KTD 2155(O)	2	
Triac	2078000998	Triac Q4015	1	
Diodes				
D101L/101R	2058010101	Diode IN 60	4	
D102L/102R				
D103L/103R	2058304100	Diode IN 4148	12	
D104L/104R				
D105L/105R				
D106L/106R				
D107L/107R				
D108L/108R				
Resistors				
R101L/101R	3009152973	RES CF 1.5K 1/5W JN	2	
R102L/102R	3039153572-F	RES MO 15K 2W J	2	
R103L/103R	3009271973	RES CF 270 1/5W JN	4	
R104L/104R				
R105L/105R	3039153572-F	RES MO 15K 2W J	2	
R106L/106R		Not Used!		
R107L/107R	3009473973	RES CF 47K 1/5W JN	2	
R108L/108R		Not Used!		
R109L/109R		Not Used!		
R110L/110R	3009102973	RES CF 1K 1/5W JN	4	
R111L/111R				
R112L/112R	3009103973	RES CF 10K 1/5W JN	4	
R113L/113R				
R114L/114R	3009153973	RES CF 15K 1/5W JN	2	
R115L/115R	3009561973	RES CF 560 1/5W JN	2	
R116L/116R	3009680973	RES CF 68 1/5W JN	2	
R117L/117R	3039103572-F	RES MO 10K 2W JN	2	
R118L/118R	3009221973	RES CF 220 1/5W JN	4	
R119L/119R				
R120L/120R	3009152973	RES CF 1.5K 1/5W JN	2	
R121L/121R		Not Used!		
R122L/122R	3009152973	RES CF 1.5K 1/5W JN	2	

Ref. No.	Part No.	Description	Q'ty	Remarks
R123L/123R	3009223973	RES CF 22K 1/5W JN	2	
R124L/124R	3039271472-F	RES MO 270 1W J	2	
R125L/125R	3009752973	RES CF 7.5K 1/5W JN	2	
R126L/126R	3009103973	RES CF 10K 1/5W JN	2	
R127L/127R	3009221973	RES CF 220 1/5W JN	4	
R128L/128R				
R129L/129R	3059278782	RES CF 0.27 5W JN	8	
R130L/130R				
R131L/131R				
R132L/132R				
R133L/133R		Not Used!		
R134L/134R		Not Used!		
R135L/135R	3039479572-F	RES MO 4.7 2W JN	2	
R136L/136R	3009561973	RES CF 560 1/5W JN	2	
R137L/137R	3009103973	RES CF 10K 1/5W JN	2	
R138L/138R	3039100683	RES MO 10 3W W/COIL	2	
R139L	3009102973	RES CF 1K 1/5W JN	1	
R140L	3009183973	RES CF 18K 1/5W JN	1	
Variable Resistors				
SMVR109L/109R SMVR121L/121R	3248347120	RES SEMI CS 470B 10/5	4	
Capacitors				
C101L/101R	3509821130-T	CAP CE B 820PF 50V K	2	
C102L/102R	3409210071-T	CAP AF RSG 10UF 50V	2	
C103L/103R	3409847041-T	CAP AF NP 47UF 25V	2	
C104L/104R	3509470130-T	CAP CE SL 47PF 50V J	2	
C105L/105R		Not Used!		
C106L/106R	3409847041-T	CAP AF NP 47UF 25V	2	
C107L/107R	3509102530-T	CAP CE B 0.001UF 50V K	2	
C108L/108R	3409210071-T	CAP AF RSG 10UF 50V	4	
C109L/109R				
C110L/110R	3509101130-T	CAP CE SL 100PF 50V J	6	
C111L/111R				
C112L/112R				
C113L/113R	3609104120-T	CAP MA 0.1UF 100V J	2	
C114L	3509473530-T	CAP CE F 0.047UF 50V Z	1	
Connectors				
	4428596602	Con Wafer LW-1143-02P	2	
	4428596603	Con Wafer LW-1143-03P	1	
	4428598305	Con Wafer LW-0640-5P	2	
	4428598304	Con Wafer LW-0640-4P	1	
	4428595002	Con Wafer LW-5267-2P	1	
	4428596203	Con Lock Wafer LW-1145-03P	1	
Others				
	5508223430	Fuse NB 31.8mm 6A/250V KS	2	B,C,D
	5508223433	Fuse NB 31.8mm 6A/250V UL/CSA	2	A
Input P.C. Board 4005115610				
IC				
IC201	2118010232	IC TL-072N (NJM) JRC	1	

Ref. No.	Part No.	Description	Q'ty	Remarks
Diodes				
ZD201/202	2058510150	Diode Zener UZP-15B (13.9, 15.9)	2	
Resistors				
R201L/201R	3009472973	RES CF 4.7K 1/5W JN	4	
R202L/202R				
R203L/203R	3009472973	RES CF 4.7K 1/5W JN	2	
R204L/204R	3009472973	RES CF 4.7K 1/5W JN	2	
R205/206	3009272973	RES CF 2.7K 1/5W JN	2	
R207L/207R	3009474973	RES CF 470K 1/5W JN	2	
R208/209	3039222572-F	RES MO 4.7K 2W JN	2	
Capacitors				
C201L/201R	3409847041-T	CAP AF NP 47UF 25V	4	
C202L/202R				
C203L/203R	3509509030-T	CAP CE SL 5PF 50V J	2	
C204L/204R	3509101130-T	CAP CE SL 100PF 50V J	4	
C205L/205R				
C206L/206R		Not Used!		
C207L/207R		Not Used!		
C208/209	3409247071-T	CAP AF RSG 47UF 50V	2	
C210L/210R	3409847041-T	CAP AF NP 47UF 50V	2	
Connectors				
	4428594902	Con Wafer LA-5268-2P	2	
	4428598705	Con Wafer LA-0640-5P	1	
Power Supply P.C. Board 4005115651				
Transistors				
Q501-506	2008606108-T	TR NPN KTC 2240BL	6	
Diodes				
ZD502	2058502240	Diode Zener UZ-24BM	1	
Resistors				
R501	3009153973	RES CF 15K 1/5W JN	1	
R502	3009122973	RES CF 1.5K 1/5W JN	1	
R503	3009153973	RES CF 15K 1/5W JN	1	
R504	3009473973	RES CF 47K 1/5W JN	1	
R505	3009333973	RES CF 33K 1/5W JN	1	
R506	3009100973	RES CF 10 1/5W JN	1	
R507/508	3009472973	RES 4.7K 1/5W JN	2	
R509	3009473973	RES CF 47K 1/5W JN	1	
R510	3009154973	RES CF 150K 1/5W JN	1	
R511	3009333973	RES CF 33K 1/5W JN	1	
R512/513	3009123973	RES CF 12K 1/5W JN	2	
R514/515	3009683973	RES CF 68K 1/5W JN	2	
Capacitors				
C503	3409222141-T	CAP AF RSG 220UF 25V J	1	
C504	3609104120-T	CAP MA 0.1UF 100V J	1	
C507	3408210231	CAP RSA 1000UF 16V SNAP	1	
	3419068208	CAP AF HM 6800UF 80V	2	
Others				
RELAY	5528009980	Relay HR-311	1	

Ref. No.	Part No.	Description	Q'ty	Remarks
Connectors				
	4428596604	Con Lock Wafer LW-1143-04P	1	
	4428596603	Con Lock Wafer LW-1143-03P	1	
	4428595002	Con Wafer LW-5267-2P	3	
	4428598303	Con Wafer LW-0640-3P	1	
Volume P.C. Board 4005115620				
Resistors				
R301L/301R	3009123973	RES CF 12K 1/5W JN	2	
R302L/302R	3009563973	RES CF 56K 1/5W JN	2	
Capacitors				
C301L/301R	3609104120-T	CAP MA 0.1UF 100V J	2	
Connectors				
	4428598707	Con Wafer LA-0640-7P	1	
	4428598705	Con Wafer LA-0640-5P	1	
Connector Lead Ass'ies				
	4428599020	T187 Terminal Housing (0.5T)	2	
	4355468916	Socket Wire Ass'y (360mm)	2	
	4355468910	Socket Wire Ass'y (210mm)	1	
	4355979110	Con Ass'y (Power)	1	
	4355981110	Con Ass'y Output	1	
	4355981120	Con Ass'y Output	1	
	4355981610	Con Ass'y CH1 Input	1	
	4355981510	Con Ass'y (Volume)	1	
	4355981011	Con Ass'y 7P	1	
	4365999010	Lug Terminal 187	1	
	4355981211	Con Ass'y 2P Power LED	1	
	4355981310	Con Ass'y 3P (280mm)	1	
	4408198610	Terminal Ass'y 2P	2	
	4355961811	Con Ass'y 2P	1	
	4355981411	Con Ass'y 2P	1	
	4465999010	Lug Terminal 187	2	
Ass'y Chassis Mounting				
	2828084020	Power Transformer	1	
	5508423730	Fuse TS 31.8mm 8A/250V KS	1	B, C, D
	5508423233	Fuse TS 31.8mm 4A/250V UL/CSA	1	A
Power LED	2308252222	LED REF SLR-54UR R5 RED ROHM	1	
Protection	2308958352	LED T-Color SPR-54mvw R5 M.WHI	1	
Clip	2308252222	LED REF SLR-54UR R5 RED ROHM	2	
	4678699800	Thermo Switch T95AR IVI	2	

Electrical Parts List (MA-620)

PRODUCT SAFETY NOTICE: If you replace any of these components, carefully read the product safety notice of this manual. Don't degrade the safety of the product through improper servicing.
Remark meaning for version, therefore refer to power requirement of specifications in this manual.

Ref. No.	Part No.	Description	Q'ty	Remarks
Main P.C. Board 4005115603				
Transistors				
Q101L/101R	2008606108-T	TR NPN KTC 2240BL (KTC 3200 BL)	8	
Q102L/102R				
Q103L/103R				
Q104L/104R				
Q105L/105R	2028107984	TR PNP 2SA 1306A(Y) KTA 1659A(Y)	4	
Q106L/106R				
Q107L/107R	2028407990	TR NPN 2SC 3298A(Y) KTC 4370A(Y)	4	
Q108L/108R				
Q109L/109R	2008606108-T	TR NPN KTC 2240BL (KTC 3200BL)	2	
Q110L/110R	2028407118	TR NPN 2SC 2238Y	2	
Q111L/111R	2028107115	TR PNP 2SA 968Y	2	
Q112L/112R	2008606104-T	TR NPN KTC 3198Y	2	
Q113L/113R	2008606105-T	TR PNP KTA 1266Y	2	
Q114L/114R	2028117995	TR PNP 2SA 1494(O)/WACC	2	
Q115L/115R	2028427999	TR NPN 2SC 3858(O)	2	
Q116L/116R	2028117995	TR PNP 2SA 1494(O)/WACC	2	
Q117L/117R	2028427999	TR NPN 2SC 3858(O)	2	
Triac	2078000998	Triac Q4015	1	
Diodes				
D101L/101R	2058010101	Diode IN 60	4	
D102L/102R				
D103L/103R	2058304100	Diode IN 4148	12	
D104L/104R				
D105L/105R				
D106L/106R				
D107L/107R				
D108L/108R				
Resistors				
R101L/101R	3009152973	RES CF 1.5K 1/5W JN	2	
R102L/102R	3039153572-F	RES MO 18K 2W J	2	
R103L/103R	3009271973	RES CF 270 1/5W JN	4	
R104L/104R				
R105L/105R	3039153572-F	RES MO 18K 2W J	2	
R106L/106R	3009223973	RES CF 22K 1/5W JN	2	
R107L/107R	3009473973	RES CF 47K 1/5W JN	2	
R108L/108R	3009103973	RES CF 10K 1/5W JN	2	
R109L/109R		Not Used!		
R110L/110R	3009102973	RES CF 1K 1/5W JN	4	
R111L/111R				
R112L/112R	3009103973	RES CF 10K 1/5W JN	4	
R113L/113R				
R114L/114R	3009153973	RES CF 15K 1/5W JN	2	
R115L/115R	3009471973	RES CF 470 1/5W JN	2	
R116L/116R	3009680973	RES CF 68 1/5W JN	2	
R117L/117R	3039103572-F	RES MO 10K 2W JN	2	
R118L/118R	3009221973	RES CF 220 1/5W JN	4	
R119L/119R				
R120L/120R	3009152973	RES CF 1.5K 1/5W JN	2	
R121L/121R		Not Used!		
R122L/122R	3009152973	RES CF 1.5K 1/5W JN	2	
R123L/123R	3009273973	RES CF 27K 1/5W JN	2	
R124L/124R	3039271472-F	RES MO 270 1W J	2	
R125L/125R	3009562973	RES CF 5.6K 1/5W JN	2	
R126L/126R	3009103973	RES CF 10K 1/5W JN	2	
R127L/127R	3009150973	RES CF 150 1/5W JN	4	
R128L/128R				
R129L/129R	3059278782	RES CE 0.27 5W JN	8	
R130L/130R				
R131L/131R				
R132L/132R				
R133L/133R		Not Used!		
R134L/134R		Not Used!		
R135L/135R	3039479572-F	RES MO 4.7 2W JN	2	
R136L/136R	3009561973	RES CF 560 1/5W JN	2	
R137L/137R	3009104973	RES CF 100K 1/5W JN	2	
R138L/138R	3039100683	RES MO 10 3W W/COIL	2	
R139L	3009821973	RES CF 820 1/5W JN	1	
R140L	3009273973	RES CF 27K 1/5W JN	1	
Variable Resistors				
SMVR109L/109R	3248347120	RES SEMI CS 470B 10/5	4	
SMVR121L/121R				
Capacitors				
C101L/101R	3509821130-T	CAP CE B 820PF 50V K	2	
C102L/102R	3409210071-T	CAP AF RSG 10UF 50V	2	
C103L/103R	3409847041-T	CAP AF NP 47UF 25V	2	
C104L/104R	3509470130-T	CAP CE SL 47PF 50V J	2	
C105L/105R		Not Used!		
C106L/106R	3409847041-T	CAP AF NP 47UF 25V	2	
C107L/107R	3509102530-T	CAP CE B 0.001UF 50V K	2	
C108L/108R	3409210071-T	CAP AF RSG 10UF 50V	4	
C109L/109R				
C110L/110R	3509101130-T	CAP CE SL 100PF 50V J	6	
C111L/111R				
C112L/112R				
C113L/113R	3609104120-T	CAP MA 0.1UF 100V J	2	
C114L	3509473530-T	CAP CE F 0.047UF 50V Z	1	
Connectors				
	4428596602	Con Wafer LW-1143-02P	2	
	4428596603	Con Wafer LW-1143-03P	1	
	4428598305	Con Wafer LW-0640-5P	2	
	4428598304	Con Wafer LW-0640-4P	1	
	4428595002	Con Wafer LW-5267-2P	1	
	4428596203	Con Lock Wafer LW-1145-03P	1	
Others				
	5508223730	Fuse NB 31.8mm 8A/250V KS	2	
Input P.C. Board 4005115610				
IC				
IC201	2118010232	IC TL-072N (NJM) JRC	1	

Ref. No.	Part No.	Description	Q'ty	Remarks
Diodes				
ZD201/202	2058510150	Diode Zener UZP-15B (13.9, 15.9)	2	
Resistors				
R201L/201R	3009472973	RES CF 4.7K 1/5W JN	4	
R202L/202R				
R203L/203R	3009472973	RES CF 4.7K 1/5W JN	2	
R204L/204R	3009472973	RES CF 4.7K 1/5W JN	2	
R205/206	3009272973	RES CF 2.7K 1/5W JN	2	
R207L/207R	3009474973	RES CF 470K 1/5W JN	2	
R208/209	3039682572-F	RES MO 6.8K 2W JN	2	
Capacitors				
C201L/201R	3409847041-T	CAP AF NP 47UF 25V	4	
C202L/202R				
C203L/203R	3509509030-T	CAP CE SL 5PF 50V J	2	
C204L/204R	3509101130-T	CAP CE SL 100PF 50V J	4	
C205L/205R				
C206L/206R		Not Used!		
C207L/207R		Not Used!		
C208/209	3409247071-T	CAP AF RSG 47UF 50V	2	
C210L/210R	3409847041-T	CAP AF NP 47UF 50V	2	
Connectors				
	4428594902	Con Wafer LA-5268-2P	2	
	4428598705	Con Wafer LA-0640-5P	1	

Power Supply P.C. Board 4005115651

Ref. No.	Part No.	Description	Q'ty	Remarks
Transistors				
Q501-506	2008606108-T	TR NPN KTC 2240BL	6	
Diodes				
ZD502	2058502240	Diode Zener UZ-24BM	1	
Resistors				
R501	3009153973	RES CF 15K 1/5W JN	1	
R502	3009152973	RES CF 1.5K 1/5W JN	1	
R503	3009153973	RES CF 15K 1/5W JN	1	
R504	3009473973	RES CF 47K 1/5W JN	1	
R505	3009333973	RES CF 33K 1/5W JN	1	
R506	3009100973	RES CF 10 1/5W JN	1	
R507/508	3009472973	RES 4.7K 1/5W JN	2	
R509	3009473973	RES CF 47K 1/5W JN	1	
R510	3009154973	RES CF 150K 1/5W JN	1	
R511	3009333973	RES CF 33K 1/5W JN	1	
R512/513	3009123973	RES CF 12K 1/5W JN	2	
R514/515	3009683973	RES CF 68K 1/5W JN	2	
R516	3009470973	RES CF 47 1/5W JN	1	
Capacitors				
C503	3409222141-T	CAP AF RSG 220UF 25V J	1	
C504	3609104120-T	CAP MA 0.1UF 100V J	1	
C507	3408210231	CAP RSA 1000UF 16V SNAP	1	
	3419010398	CAP AF HM 10000UF 100V	2	

Ref. No.	Part No.	Description	Q'ty	Remarks
Others				
RELAY	5528009980	Relay HR-311	1	
Connectors				
	4428596604	Con Lock Wafer LW-1143-04P	1	
	4428596603	Con Lock Wafer LW-1143-03P	1	
	4428595002	Con Wafer LW-5267-2P	3	
	4428598303	Con Wafer LW-0640-3P	1	

Volume P.C. Board 4005115620

Ref. No.	Part No.	Description	Q'ty	Remarks
Resistors				
R301L/301R	3009123973	RES CF 12K 1/5W JN	2	
R302L/302R	3009563973	RES CF 56K 1/5W JN	2	
Capacitors				
C301L/301R	3609104120-T	CAP MA 0.1UF 100V J	2	
Connectors				
	4428598707	Con Wafer LA-0640-7P	1	
	4428598705	Con Wafer LA-0640-5P	1	
Connector Lead Ass'ies				
	4428599020	T187 Terminal Housing (0.5T)	2	
	4355468916	Socket Wire Ass'y (360mm)	2	
	4355468910	Socket Wire Ass'y (210mm)	1	
	4355979110	Con Ass'y (Power)	1	
	4355981110	Con Ass'y Output	1	
	4355981120	Con Ass'y Output	1	
	4355981610	Con Ass'y CH1 Input	1	
	4355981510	Con Ass'y (Volume)	1	
	4355981011	Con Ass'y 7P	1	
	4365999010	Lug Terminal 187	1	
	4355981211	Con Ass'y 2P Power LED	1	
	4355981310	Con Ass'y 3P (280mm)	1	
	4408198610	Terminal Ass'y 2P	2	
	4355961811	Con Ass'y 2P	1	
	4355981411	Con Ass'y 2P	1	
	4465999010	Lug Terminal 187	2	
Ass'y Chassis Mounting				
	2828083902	Power Transformer	1	
	5508423430	Fuse TS 31.8mm 6A/250V UL/CSA	1	A,
	5508423830	Fuse TS 31.8mm 10A/250V KS	1	B,C,D
Power LED	2308252222	LED REF SLR-54UR R5 RED ROHM	1	
Protection	2308958352	LED T-Color SPR-54MVW R5 M.WHI	1	
Clip	2308252222	LED REF SLR-54UR R5 RED ROHM	2	
	4678699800	Thermo Switch T95AR IVI	2	

Electrical Parts List (MA-920)

PRODUCT SAFETY NOTICE: If you replace any of these components, carefully read the product safety notice of this manual. Don't degrade the safety of the product through improper servicing.
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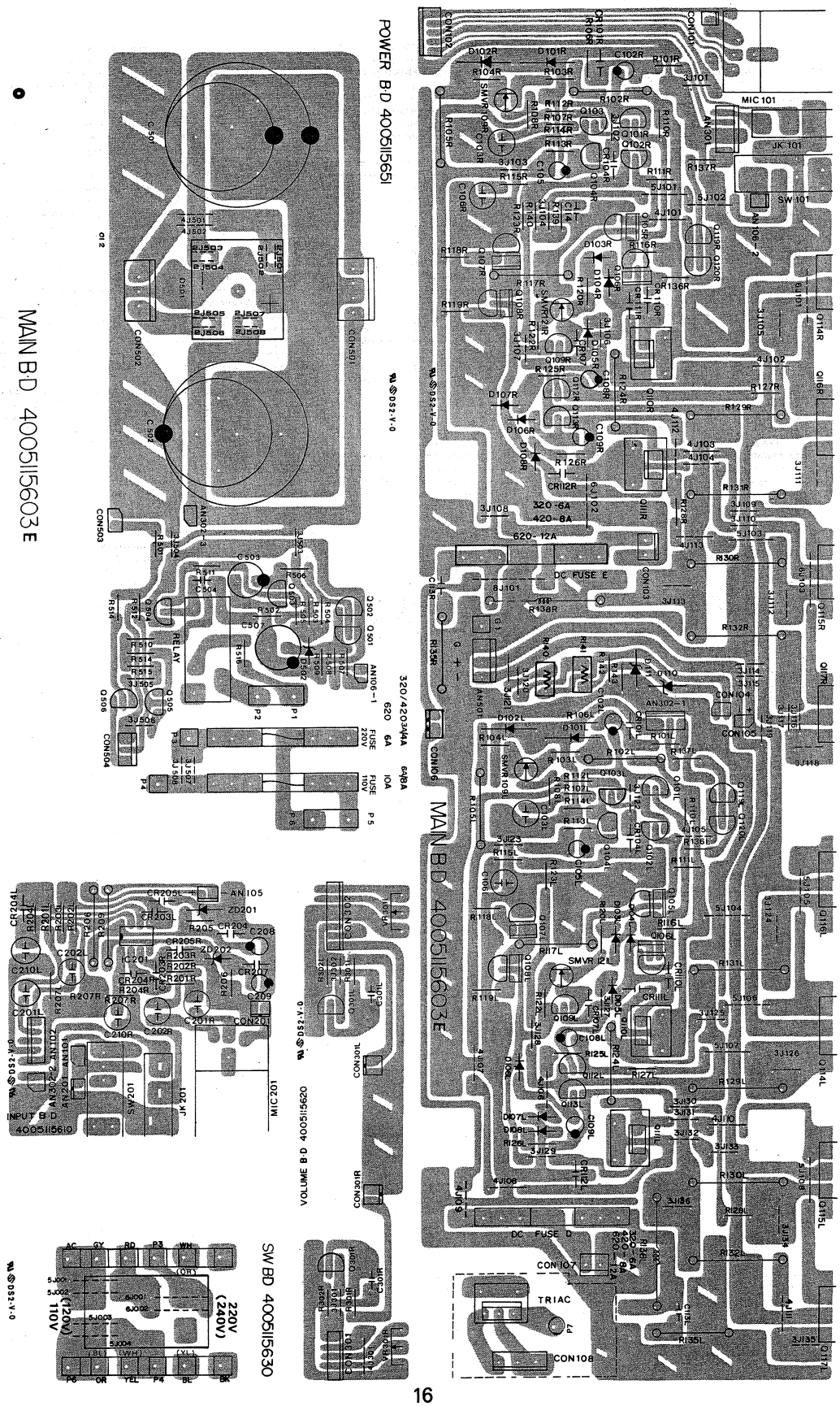
Ref. No.	Part No.	Description	Q'ty	Remarks
Main P.C. Board 4005114200				
IC				
IC101	2118010232	IC TL-072N (NJM) JRC	1	
Transistors				
Q101-104	2008606108-T	TR NPN KTC 2240BL (KTC 3200 BL)	4	
Q105/105	2028107115	TR PNP 2SA 968Y	2	
Q107/108	2028407118	TR NPN 2SC 2238Y	2	
Q109	2008610600-T	TR NPN 2SD 1302R	1	
Q111	2008610600-T	TR NPN 2SD 1302R	1	
Q113	2028427998	TR 2SC 3856/WACC	1	
Q114	2028117994	TR PNP 2SA 1492 WITH ACC	1	
Q117-121	2028407122	TR NPN 2SC 3281.0/WACC	5	
Q122-126	2028107118	TR PNP 2SA 1302(O)	5	
Q127/128	2008206104-T	TR PNP KTA 970 BL	2	
Q301-304	2008606108-T	TR NPN KTC 2240BL (KTC 3200BL)	4	
Diodes				
D101/102	2058510150	Diode Zener UZP-15B	2	
D103/104	2058010101	Diode IN 60	2	
D105-108	2058304100	Diode IN 4148	4	
D402	2058502240	Diode Zener UZ-24BM	1	
Variable Resistors				
SVR114	3248347120	RES SEMI CS 470B 10/5	1	
SVR134	3248322320	RES SEMI PR19R 22KB 10/5	1	
Resistors				
R101/102	3009472973	RES CF 4.7K 1/5W JN	2	
R103	3009472973	RES CF 4.7K 1/5W JN	1	
R104	3009472973	RES CF 4.7K 1/5W JN	1	
R105	3009474973	RES CF 470K 1/5W JN	1	
R106	3009152973	RES CF 1.5K 1/5W JN	1	
R107	3009223973	RES CF 22K 1/5W JN	1	
R108	3009473973	RES CF 47K 1/5W JN	1	
R109	3009103973	RES CF 10K 1/5W JN	1	
R110/111	3039203473-F	RES MO 20K 1W JN	2	
R113	3009271973	RES CF 270 1/5W JN	1	
R115	3009561973	RES CF 560 1/5W JN	1	
R117	3009271973	RES CF 270 1/5W JN	1	
R122/123	3009102973	RES CF 1K 1/5W JN	2	
R126	3009203973	RES CF 20K 1/5W JN	1	
R127	3009471973	RES CF 470 1/5W JN	1	
R128	3009220973	RES CF 22 1/5W JN	1	
R129	3009103973	RES CF 10K 1/5W JN	1	
R130/131	3009221973	RES CF 220 1/5W JN	2	
R132	3009303973	RES CF 30K 1/5W JN	1	
R133	3009153973	RES CF 15K 1/5W JN	1	
R135	3039470472-F	RES MO 47 1W	1	
R136	3009472973	RES CF 4.7K 1/5W JN	1	
R138-147	3059109782	RES CE 1.5W K N	10	
R148	3039100683	RES MO 10 3W W/COIL	1	
R149	3009303973	RES CF 30K 1/5W JN	1	
R150	3009821973	RES CF 820 1/5W JN	1	
R301/302	3009752973	RES CF 7.5K 1/5W JN	2	
R303	3009753973	RES CF 75K 1/5W JN	1	
R304	3009153973	RES CF 15K 1/5W JN	1	
R305	3009473973	RES CF 47K 1/5W JN	1	
R306	3009333973	RES CF 33K 1/5W JN	1	
R307	3009152973	RES CF 1.5K 1/5W JN	1	
R316	3009333973	RES CF 33K 1/5W JN	1	
Capacitors				
C101	3509509030-T	CAP CE SL 5PF 50V J	1	
C102/103	3509101130-T	CAP CE SL 100PF 50V J	2	
C104	3409247971-T	CAP AF RSG 4.7UF 50V	1	
C105	3509104530-T	CAP CE F 0.1UF 50V Z	1	
C106	3409247971-T	CAP AF RSG 4.7UF 50V	1	
C107	3509104530-T	CAP CE F 0.1UF 50V Z	1	
C108	3409847041-T	CAP AF NP 47UF 25V	1	
C109	3509821130-T	CAP CE B 820PF 50V K	1	
C110	3409210071-T	CAP AF RSG 10UF 50V	1	
C111	3509470130-T	CAP CE SL 47PF 50V J	1	
C112	3409847041-T	CAP AF NP 47UF 25V	1	
C114	3409847041-T	CAP AF NP 47UF 25V	1	
C115	3509473530-T	CAP CE F 0.047UF 50V Z	1	
C116	3509101250	CAP CE 100PF 1KV	1	
C117	3509102530-T	CPA CE B 0.001UF 50V J	1	
C118/119	3509101250	CAP CE 100PF 1KV	2	
C121	3409847041-T	CAP AF NP 47UF 25V	1	
C123/124	3409210071-T	CAP AF RSG 10UF 50V	2	
C301	3408210231	CAP RSA 1000UF 16V SNAP	1	
C302	3409222141-T	CAP AF RSG 220UF 25V J	1	
C303	3609104120-T	CAP MA 0.1UF 100V J	1	
Others				
	5508223930	FUSE NB 31.8mm 12A/250V KS	2	
Connectors				
	4428595002	Con Wafer LW-5267-2P	5	
	4428596602	Con Wafer LW-1143-02P	2	
	4428598305	Con Wafer LW-0640-5P	2	
	4428598303	Con Wafer LW-0640-3P	2	
	4428596603	Con Lock Wafer LW-1143-03P	2	
	4428598304	Con Wafer LW-0640-4P	1	
Volume P.C. Board 4005114230				
Transistors				
Q501/502	2008606108-T	TR NPN KTC 2240BL (KTC 3200 BL)	2	
Resistors				
R501	3009123973	RES CF 12K 1/5W JN	1	
R502	3009563973	RES CF 56K 1/5W JN	1	
R503	3009123973	RES CF 12K 1/5W JN	1	
R504	3009563973	RES CF 56K 1/5W JN	1	
Capacitors				
C501/502	3609104120-T	CAP MA 0.1UF 100V J	2	

Ref. No.	Part No.	Description	Q'ty	Remarks
Connectors				
	4428598705	Con Wafer LA-0640-5P	1	
	4428598706	Con Wafer LA-0640-6P	1	
Power P.C. Board 4005114221				
Transistors				
Q305-307	2008606108-T	TR NPN KTC 2240BL (KTC 3200BL)	3	
Q308	2028406113	TR NPN KTD 2058Y (D880Y)	1	
Diodes				
D403/404	2058100996	Diode Rectifier IN 4006	2	
D405	2058502240	Diode Zener UZ-24BM	1	
D406	2058100996	Diode Rectifier IN 4006	1	
Resistors				
R120/121	3039682572-F	RES MO 6.8K 2W J	2	
R309	3009183973	RES CF 18K 1/5W JN	1	
R310	3009154973	RES CF 2.7K 1/5W JN	1	
R311/312	3009683973	RES CF 68K 1/5W JN	2	
R313	3009183973	RES CF 18K 1/5W JN	1	
R314	3009153973	RES CF 15K 1/5W JN	1	
R315	3009470973	RES 47 1/5W JN	1	
R317	3009333973	RES CF 33K 1/5W JN	1	
R318	3009272973	RES CF 2.7K 1/5W JN	1	
R319	3009822973	RES CF 8.2K 1/5W JN	1	
R320	3039682572-F	RES MO 6.8K 2W J	1	
R321/323	3059100982	RES CE 10 30W K Y	3	
Capacitors				
C307	3408210191	CAP RSA 100UF 100V SNAP	1	
C308	3409222171-T	CAP AF RSG 220UF 50V	1	
Others				
Triac	2078000995	Triac 25C60	1	
Fan Drive	5528009990	Relay HR 703 VHD DC 24V	1	
Protect	5528009970	Relay HR-315K DC 12V	1	
Start	5528009940	Relay HR-313K DC 24V	1	
Connectors				
	4428596603	Con Lock Wafer LW-1143-03P	2	
	4428598304	Con Wafer LW-0640-4P	1	
	4428598306	Con Wafer LW-0640-6P	1	
	4428595002	Con Wafer LW-5267-2P	2	
	4428598305	Con Wafer LW-0640-5P	1	
	4428598303	Con Wafer LW-0640-3P	1	

Ref. No.	Part No.	Description	Q'ty	Remarks
Connector Lead Ass'ies				
	4355499620	Socket/W Ass'y	1	
	4465999010	Lug Terminal 187	2	
	4355986210	Con Ass'y 6P	1	
	4355975910	Con Ass'y 5P	1	
	4355976011	Con Ass'y 6P	1	
	4355972310	Con Ass'y 4P	1	
	4355973810	Con Ass'y 6P	1	
	4355498010	Socket Terminal Power	1	
	4465999010	Lug Terminal 187	1	
	4408198610	Terminal Ass'y 2P	2	
	4355976110	Con Ass'y 2P (140mm)	2	
	4355499610	Con Ass'y	2	
	4355972110	Con Ass'y 5P (420mm)	1	
	4355971811	Con Ass'y 2P	2	
	4355971911	Con Ass'y 2P	1	
	4355972210	Con Ass'y 4P	1	
Ass'y Chassis Mounting				
	2828083800	Power Transformer	1	
	5508423730	Fuse TS 31.8mm 8A/250V KS	1	B, C, D
	5508222930	Fuse NB 31.8mm 3A/250V UL/CSA	1	A
Power LED	2308252222	LED REF SLR-54UR R5 RED ROHM	1	
Protection	2308958352	LED T-Color SPR-54mvw R5 M.WHI	1	
Clip	2308252222	LED REF SLR-54UR R5 RED ROHM	2	
	4678699800	Thermo Switch T95AR IUI	2	
	4678699900	Switch Push T70AR IUI	2	

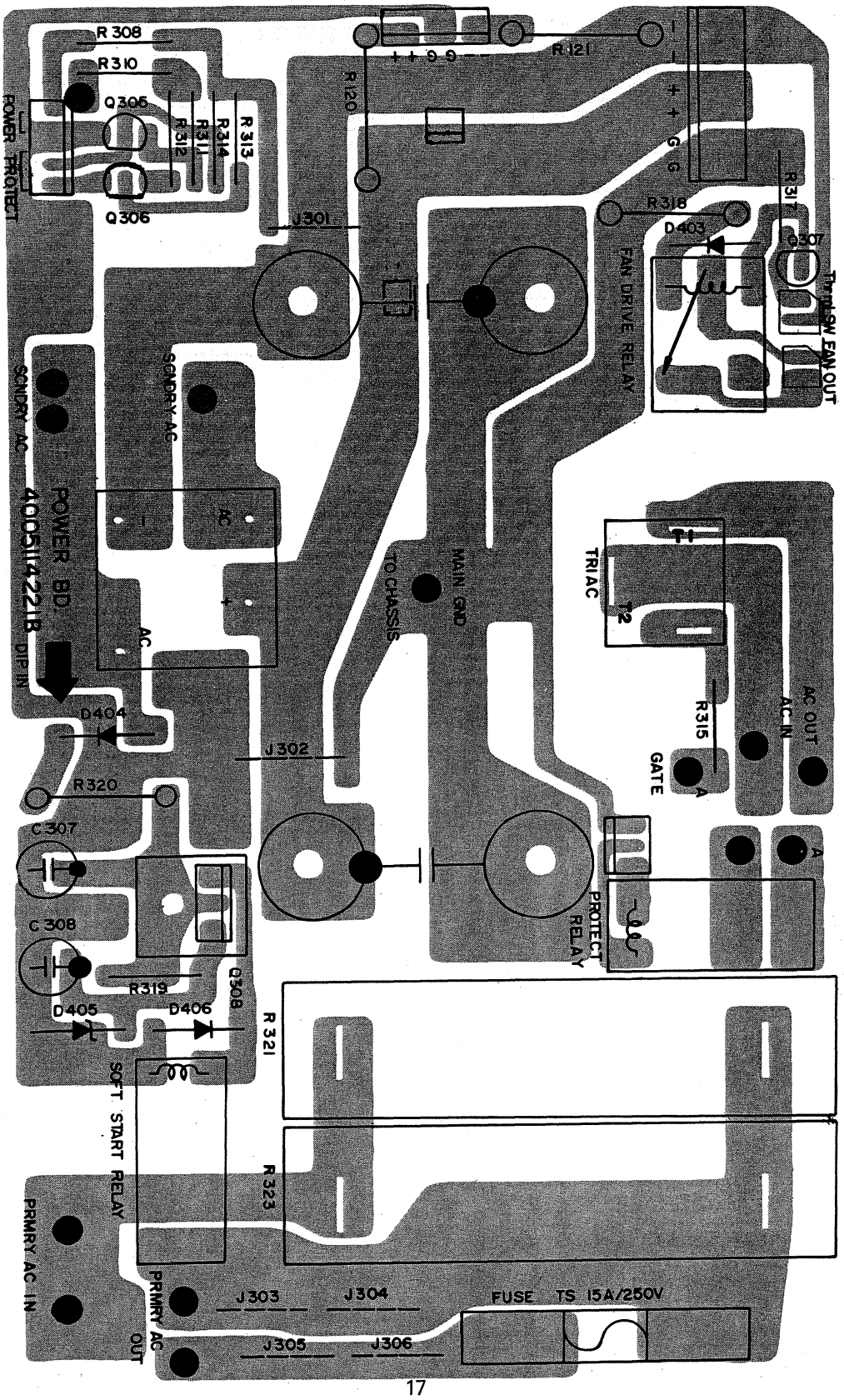
Top View of P.C. Boards (MA-320/420/620/920)

MAIN BD (4005115603)



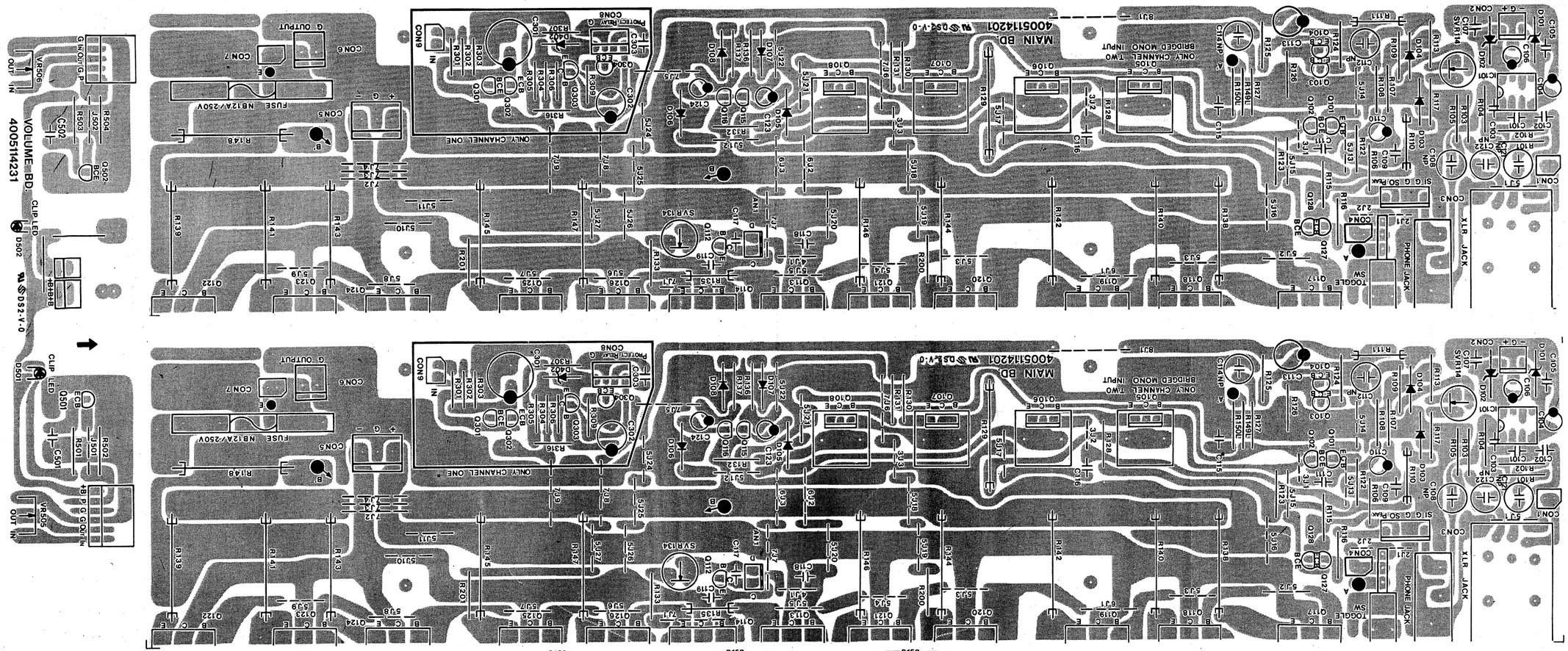
Top View of P.C. Boards

POWER BD (4005114221B)



Top View of P.C. Boards (MA-920)

MAIN B'D (MAIN B'D)



Mechanical Parts List (MA-320/420)

No.	Part No.	Description	Q'ty	Remark
1	8525999510	KNOB CONTROL	2	
2	8525999530	PLATE VOLUME	2	
3	046121099101	COVER TOP	1	
4	048602991801	FRONT PANEL	1	
5	6715997510	LED LIMITER	4	
6	6505992010	BRACKET PHONE JACK	1	
7	4625999410	SW POWER	1	
8	048603999201	BASE RACK MOUNT 2H	2	
9	6122296710	CHASSIS FRONT	1	
10	6121698110	CHASSIS MAIN	1	
11	8209540011	NUT FLANGE M4	1	
12	4465100110	GND TERMINAL	2	
13	8329040011	WASHER THD/IN ϕ4Y	2	
14	6505990710	BRACKET (SMALL) PCB	2	
15	6715998620	RUBBER SPONGE	1	
16	6503992610	BRACKET MTG	1	
17	6503992620	BRACKET MTG	1	
18	2828084120	TRANSFORMER POWER	1	
19	6715004410	RUBBER CUSHION	2	
20	6335000410	RUBBER FOOT	4	
21	6735997010	INSULATION PLATE	1	
22	6715001310	RUBBER SPONGE	1	
23	6513000210	STOPPER CORD	1	
24	046123697301	PLATE INPUT	1	
25	4408197720	TERMINAL SCREW	1	
26	6735996410	TERMINAL PLATE	1	
27	8209130011	NUT M3	2	
28	8525998410	JACK NUT	6	
29	4308999910	CORD AC	1	
30	046123697202	OUTPUT PLATE	1	
31	4408198610	TERMINAL ASS'Y 2P	2	
32	6505990610	BRACKET 'L' PCB	2	
33	6505992010	BRACKET PHONE JACK	1	
34	4618999610	SW VOLTAGE SELECTOR	1	
35	4005115603	PCB MAIN	1	
36	4005115651	PCB POWER	1	
37	7502097810	HEAT SINK 'R' POWER	1	
38	7502097710	HEAT SINK 'L' POWER	1	
39	6503993710	BRACKET 'L' H/SINK	1	
40	6505990810	BRACKET (SMALL) HEAT SINK	1	
41	8109330061	SCREW #3BTC 3×6Y	18	
42	8109330083	SCREW #3BTC 3×8B	4	
43	8109330081	SCREW #3BTC 3×8Y	4	
44	8109340061	SCREW #3BTC 4×6	6	
45	81293300831	SCREW #3FTC 3×8BK	4	
46	8109230083	SCREW #2BTC 3×8B	4	
47	8109230081	SCREW #2BTC 3×8Y	16	
48	8159230061	SCREW #2WPTC 3×6Y	13	
49	8009130063	SCREW BM 3×6B	2	
50	8009130121	SCREW BM 3×12Y	2	
51	8009140061	SCREW BM 4×6Y	10	
52	8009140081	SCREW BM 4×8Y	4	
53	8009140083	SCREW BM 4×8BK	4	
54	8009140101	SCREW BM 4×10Y	4	
55	8009140123	SCREW BM 4×12B	4	
56	8009140201	SCREW BM 4×20Y	1	
57	8119440083	SCREW WSAM 4×8B	4	
58	8099130121	HEX MSPW 3×12Y	8	
59	8319130011	WASHER SPRING ϕ3Y	4	

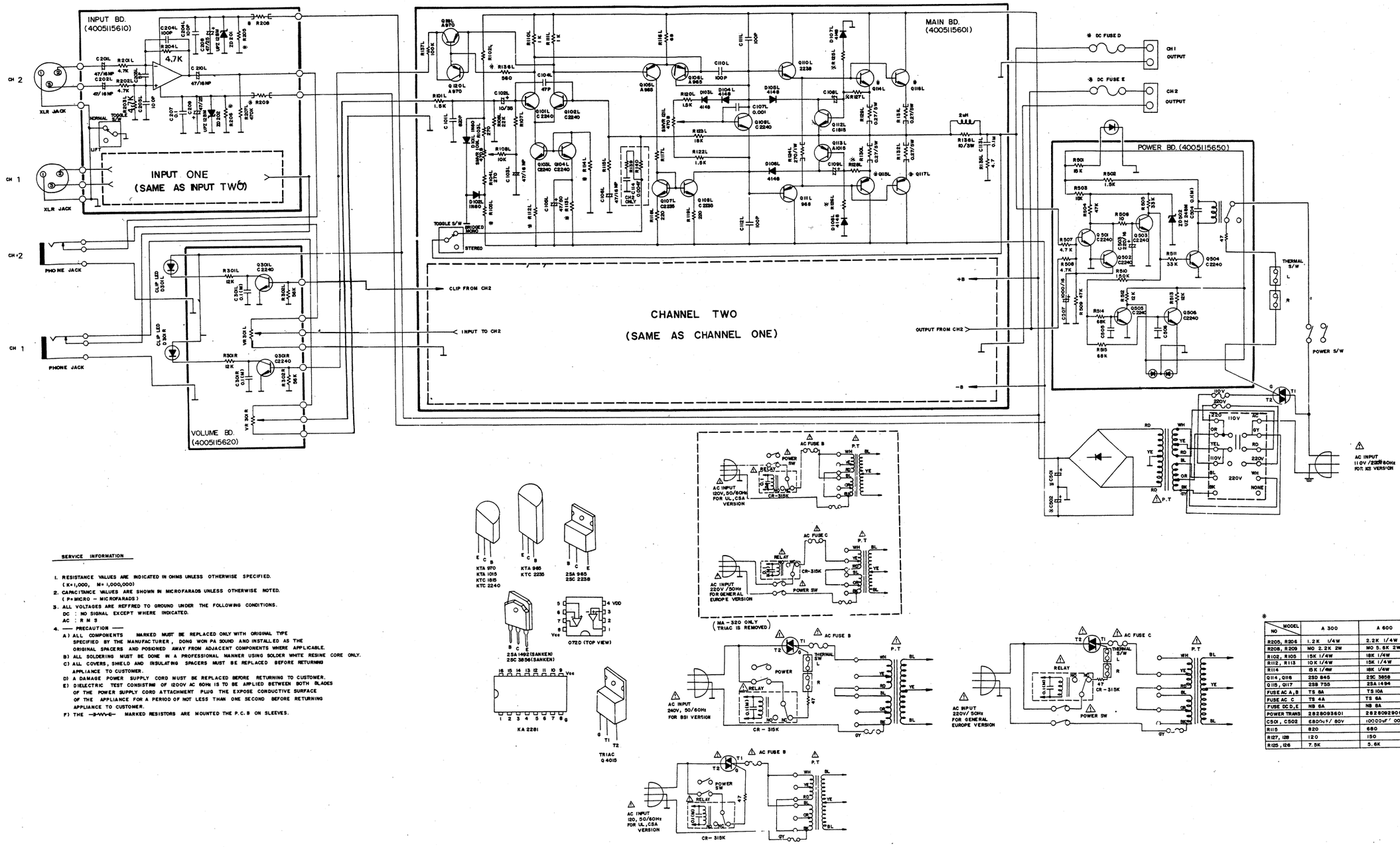
No.	Part No.	Description	Q'ty	Remark
1	8525999510	KNOB CONTROL	2	
2	8525999530	PLATE VOLUME	2	
3	046121099101	COVER TOP	1	
4	048602991811	FRONT PANEL	1	
5	6715997510	LED LIMITER	4	
6	6505992010	BRACKET PHONE JACK	1	
7	4625999410	SW POWER	1	
8	048603999201	BASE RACK MOUNT 2H	2	
9	6122296710	CHASSIS FRONT	1	
10	6121698110	CHASSIS MAIN	1	
11	8209540011	NUT FLANGE M4	5	
12	4465100110	GND TERMINAL	2	
13	8329040011	WASHER THD/IN ϕ4Y	2	
14	6505990710	BRACKET (SMALL) PCB	2	
15	6715998620	RUBBER SPONGE	1	
16	6503992610	BRACKET MTG	1	
17	6503992620	BRACKET MTG	1	
18	2828084120	TRANSFORMER POWER	1	
19	6715004410	RUBBER CUSHION	2	
20	6335000410	RUBBER FOOT	4	
21	6735997010	INSULATION PLATE	1	
22	6715001310	RUBBER SPONGE	1	
23	6513000210	STOPPER CORD	1	
24	046123697301	PLATE INPUT	1	
25	4408197720	TERMINAL SCREW	1	
26	6735996410	TERMINAL PLATE	1	
27	8209130011	NUT M3	2	
28	8525998410	JACK NUT	6	
29	4308999910	CORD AC	1	
30	046123697215	OUTPUT PLATE	1	
31	4408198610	TERMINAL ASS'Y 2P	2	
32	6505990610	BRACKET 'L' PCB	2	
33	6505992010	BRACKET PHONE JACK	1	
34	4618999610	SW VOLTAGE SELECTOR	1	
35	4005115603	PCB MAIN	1	
36	4005115651	PCB POWER	1	
37	7502097810	HEAT SINK 'R' POWER	1	
38	7502097710	HEAT SINK 'L' POWER	1	
39	6503993710	BRACKET 'L' H/SINK	1	
40	6505990810	BRACKET (SMALL) H/SINK	1	
41	4458000210	HOLDER FUSE	1	
42	8109330061	SCREW #3BTC 3×6Y	20	
43	8109330083	SCREW #3BTC 3×8B	4	
44	8109330081	SCREW #3BTC 3×8Y	4	
45	8109230083	SCREW #2BTC 3×8B	4	
46	8109230081	SCREW #2BTC 3×8Y	13	
47	8129330083	SCREW #3FTC 3×8BK	6	
48	8159230061	SCREW #2WPTC 3×6Y	13	
49	8109340061	SCREW #3BTC 4×6	6	
50	8009130061	SCREW BM 3×6Y	4	
52	8009130063	SCREW BM 3×6B	2	
53	8009130121	SCREW BM 3×12Y	2	
54	8009140061	SCREW BM 4×6Y	10	
55	8009140083	SCREW BM 4×8BK	4	
56	8009140101	SCREW BM 4×10Y	8	
57	8009140123	SCREW BM 4×12B	4	
58	8009140201	SCREW BM 4×20Y	1	
59	8119440083	SCREW WSAM 4×8B	4	
60	8319130011	WASHER SPRING ϕ3Y	5	

Mechanical Parts List (MA-620/920)

No.	Part No.	Description	Q'ty	Remark
1	8525999510	KNOB CONTROL	2	
2	8525999530	PLATE VOLUME	2	
3	046121098010	TOP COVER	1	
4	048602991610	FRONT PANEL	1	
5	6715997510	LED LIMITER	4	
6	6505992010	BRACKET PHONE JACK	1	
7	4625999410	SW POWER	1	
8	048603999301	HANDLE 3H	2	
9	6122296610	CHASSIS FRONT	1	
10	6121697910	CHASSIS MAIN	1	
11	8209540011	NUT FLANGE M4	1	
12	6735997010	INSULATION PLATE	1	
13	8209140011	NUT M4Y	2	
14	4465100110	GND TERMINAL	2	
15	8329040011	WASHER THD/IN ϕ4Y	2	
16	6505990710	BRACKET (SMALL) PCB	2	
17	6503992610	BRACKET MTG	1	
18	6503992620	BRACKET MTG	1	
19	8209550011	NUT FLANGE M5	4	
20	6335000410	RUBBER FOOT	4	
21	2828083902	TRANSFORMER POWER	1	
22	6715998620	RUBBER SPONGE	1	
23	6513000210	STOPPER CORD	1	
24	046123696801	PLATE INPUT	1	
25	8525998410	JACK NUT	6	
26	4308999610	CORD AC	1	
27	046123695801	PLATE OUTPUT	1	
28	4408198610	TERMINAL ASS'Y 2P	2	
29	4458000210	HOLDER FUSE	1	
30	6505992010	BRACKET PHONE JACK	1	
31	6505990610	BRACKET 'L' PCB	2	
32	4005115603	PCB MAIN	1	
33	7502098510	HEAT SINK 'R' POWER	1	
34	7502098520	HEAT SINK 'L' POWER	1	
35	8099130121	HEX MSPW 3×12Y	16	
36	6503993710	BRACKET 'L' H/SINK	1	
37	6505990810	BRACKET (SMALL) H/SINK	1	
38	8109230083	SCREW #2BTC 3×8B	6+4	
39	8129230083	SCREW #2FTC 3×8BK	4	
40	8109230061	SCREW #2BTC 3×6Y	1+6	
41	8109230081	SCREW #2BTC 3×8Y	4+4+4	
42	8109330061	SCREW #3BTC 3×6Y	3+6	
43	8109340061	SCREW #3BTC 4×6	6	
44	8159230061	SCREW #2WPTC 3×6Y	8+4	
45	8129330083	SCREW #3FTC 3×8BK	1	
46	8109230063	SCREW #2BTC 3×6BK	2	
47	8159240083	SCREW #2WPTC 4×8B	4	
48	8009130063	SCREW BM 3×6B	2	
49	8009130061	SCREW BM 3×6Y	2	
50	8009140061	SCREW BM 4×6Y	2+8	
51	8009140083	SCREW BM 4×8BK	4	
52	8009140081	SCREW BM 4×8Y	2	
53	8009140123	SCREW BM 4×12B	4	
54	8009140101	SCREW BM 4×10Y	6	
55	8009140201	SCREW BM 4×20Y	1	
56	8009150123	SCREW BM 5×12B	4	
57	8319130011	WASHER SPRING ϕ3Y	1	

No.	Part No.	Description	Q'ty	Remark
1	8525999510	KNOB CONTROL	2	
2	8525999530	PLATE VOLUME	2	
3	046121098020	TOP COVER	1	
4	6121697910	CHASSIS MAIN	1	
5	6122296610	CHASSIS FRONT	1	
6	048602991612	FRONT PANEL	1	
7	048603999301	HANDLE	2	
8	6715997510	LED LIMITER	4	
9	7308999610	FAN	1	
10	6713999110	FAN CUSHION	1	
11	2828083800	TRANSFORMER POWER	1	
12	6715997810	RUBBER SPONGE	1	
13	6735996410	TERMINAL PLATE	1	
14	6503993310	SUPPORT, BRACKET	2	
15	046123696913	PLATE OUTPUT	1	
16	046123696801	PLATE INPUT	1	
17	6505992010	BRACKET PHONE JACK	2	
18	6505979710	BRACKET SUB PCB	2	
19	6503993710	BRACKET 'L'H/SINK	1	
20	6505983510	BRACKET PCB	2	
21	6505990810	BRACKET (SMALL) HEAT SINK	1	
22	6503993110	BRACKET TOP	1	
23	6505988410	BRACKET DIODE	1	
24	4005114221	PCB POWER	1	
25	4005114201	MAIN PCB	2	
26	7502098310	H/S (R)	1	
27	7502098210	H/S (L)	1	
28	6535999020	STUD (58MM)	2	
29	046123498510	COVER HEAT SINK	1	
30	6335000410	RUBBER FOOT	4	
31	6513000210	STOPPER CORD	1	
32	4465100110	GND TERMINAL	2	
33	8209130011	NUT M3	2	
34	8329040011	WASHER THD/IN	2	
35	8309140011	NUT MAY	2	
36	8319150011	WASHER SPRING MSY	4	
37	8209550011	NUT FRANGE	4	
38	8319130011	WASHER SPRING ϕ3Y	2	
39	8525998410	JACK NUT	6	
40	4625999410	SW POWER	1	
41	6505990620	BRACKET (L) PCB	2	
42	4408198610	TERMINAL ASS'Y 2P	2	
43	8109230063	SCREW #2BTC 3×6BK	2	
44	8109230061	SCREW #2BTC 3×6Y	12	
45	8109230083	SCREW #2BTC 3×8B	18	
46	8109230081	SCREW #2BTC 3×8Y	22	
47	8109330063	SCREW #3BTC 3×6B	8	
48	8109340061	SCREW #3BTC 4×6	6	
49	8129230083	SCREW #2FTC 3×8BK	4	
50	8159230061	SCREW #2WPTC 3×6Y	8	
51	8159240083	SCREW #2WPTC 4×8B	4	
52	8009130063	SCREW BM 3×6B	4	
53	8009130123	SCREW BM 3×12B	6	
54	8009130121	SCREW BM 3×12Y	2	
55	8009140061	SCREW BM 4×6Y	12	
56	8009140081	SCREW BM 4×8Y	12	
57	8009140083	SCREW BM 4×8BK	4	
58	8009140101	SCREW BM 4×10Y	6	
59	8009140123	SCREW BM 4×12B	7	
60	8009140201	SCREW BM 4×20Y	1	
61	8009150123	SCREW BM 5×12B	4	
62	8099130121	HEX MSPW 3×12Y	24	

Schematic Diagram (MA-320/420/620)



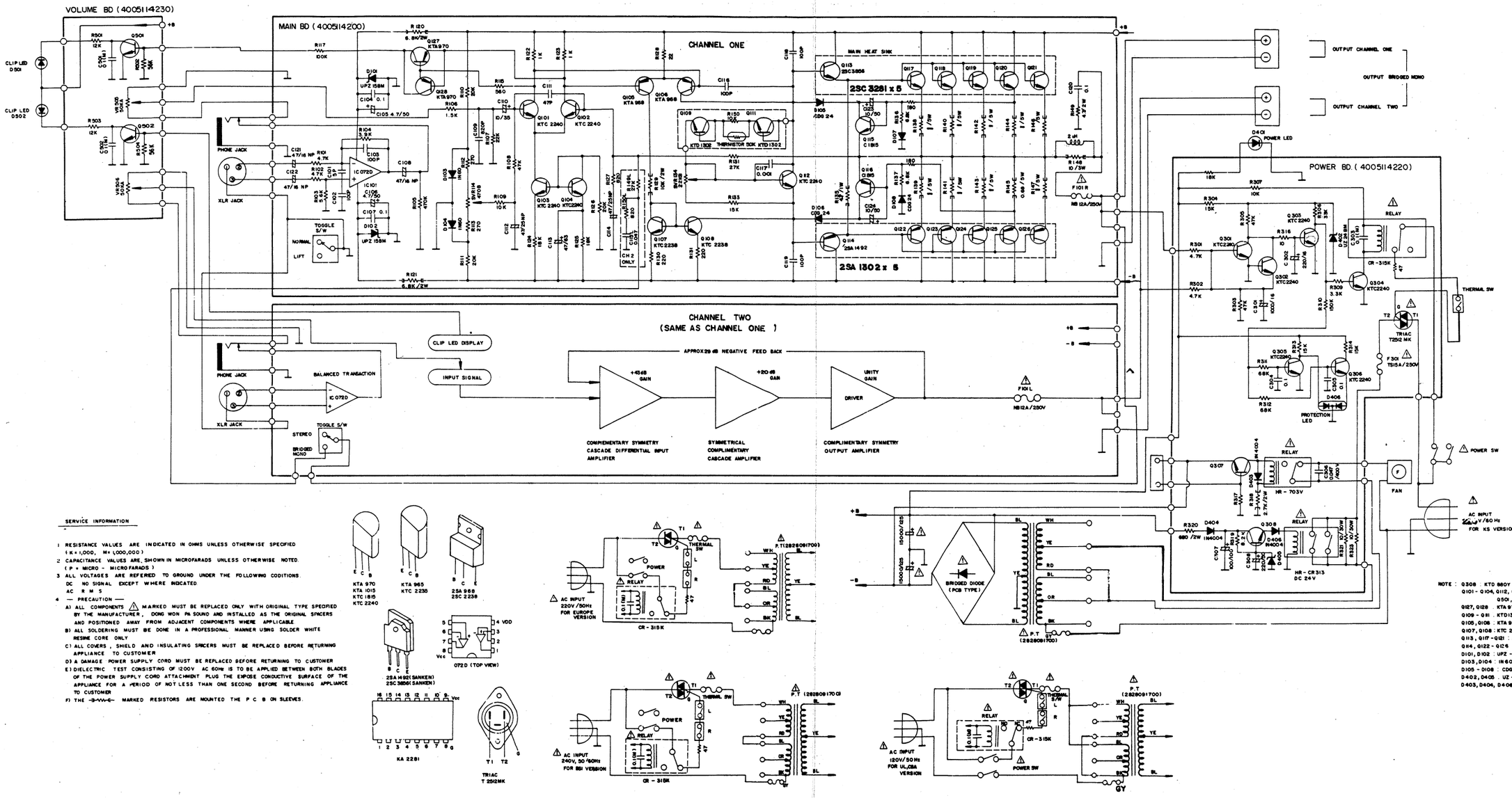
SERVICE INFORMATION

1. RESISTANCE VALUES ARE INDICATED IN OHMS UNLESS OTHERWISE SPECIFIED. (K=1,000, M=1,000,000)
2. CAPACITANCE VALUES ARE SHOWN IN MICROFARADS UNLESS OTHERWISE NOTED. (P=MICRO - MICROFARADS)
3. ALL VOLTAGES ARE REFFRED TO GROUND UNDER THE FOLLOWING CONDITIONS. DC : NO SIGNAL EXCEPT WHERE INDICATED. AC : R M S
4. —— PRECAUTION ——
   - A) ALL COMPONENTS MARKED MUST BE REPLACED ONLY WITH ORIGINAL TYPE SPECIFIED BY THE MANUFACTURER, DONG WON PA SOUND AND INSTALLED AS THE ORIGINAL SPACERS AND POSIONED AWAY FROM ADJACENT COMPONENTS WHERE APPLICABLE.
   - B) ALL SOLDERING MUST BE DONE IN A PROFESSIONAL MANNER USING SOLDER WHITE RESINE CORE ONLY.
   - C) ALL COVERS, SHIELD AND INSULATING SPACERS MUST BE REPLACED BEFORE RETURNING APPLIANCE TO CUSTOMER.
   - D) A DAMAGE POWER SUPPLY CORD MUST BE REPLACED BEFORE RETURNING TO CUSTOMER.
   - E) DIELECTRIC TEST CONSISTING OF 1200V AC 60Hz IS TO BE APPLIED BETWEEN BOTH BLADES OF THE POWER SUPPLY CORD ATTACHMENT PLUG THE EXPOSE CONDUCTIVE SURFACE OF THE APPLIANCE FOR A PERIOD OF NOT LESS THAN ONE SECOND BEFORE RETURNING APPLIANCE TO CUSTOMER.
   - F) THE —3WW-E— MARKED RESISTORS ARE MOUNTED THE P.C.B ON SLEEVES.

※

MODEL / NO	A 300	A 600
R205, R206	1.2K 1/4W	2.2K 1/4W
R208, R209	MO 2.2K 2W	MO 5.6K 2W
R102, R105	15K 1/4W	18K 1/4W
R112, R113	10K 1/4W	15K 1/4W
R114	15K 1/4W	18K 1/4W
Q114, Q116	2SD 845	2SC 3856
Q115, Q117	2SB 755	2SA 1494
FUSE AC A, B	TS 8A	TS 10A
FUSE AC C	TS 4A	TS 6A
FUSE DC D, E	NB 6A	NB 8A
POWER TRANS	2828093601	2828092900
C501, C502	6800uF/ 80V	10000uF/ 00V
R115	820	680
R127, 128	120	150
R125, 126	7.5K	5.6K

Schematic Diagram (MA-920)



SERVICE INFORMATION

1 RESISTANCE VALUES ARE INDICATED IN OHMS UNLESS OTHERWISE SPECIFIED
(K = 1,000, M = 1,000,000)
2 CAPACITANCE VALUES ARE, SHOWN IN MICROFARADS UNLESS OTHERWISE NOTED.
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3 ALL VOLTAGES ARE REFERED TO GROUND UNDER THE FOLLOWING CODITIONS.
DC NO SIGNAL EXCEPT WHERE INDICATED
AC R M S
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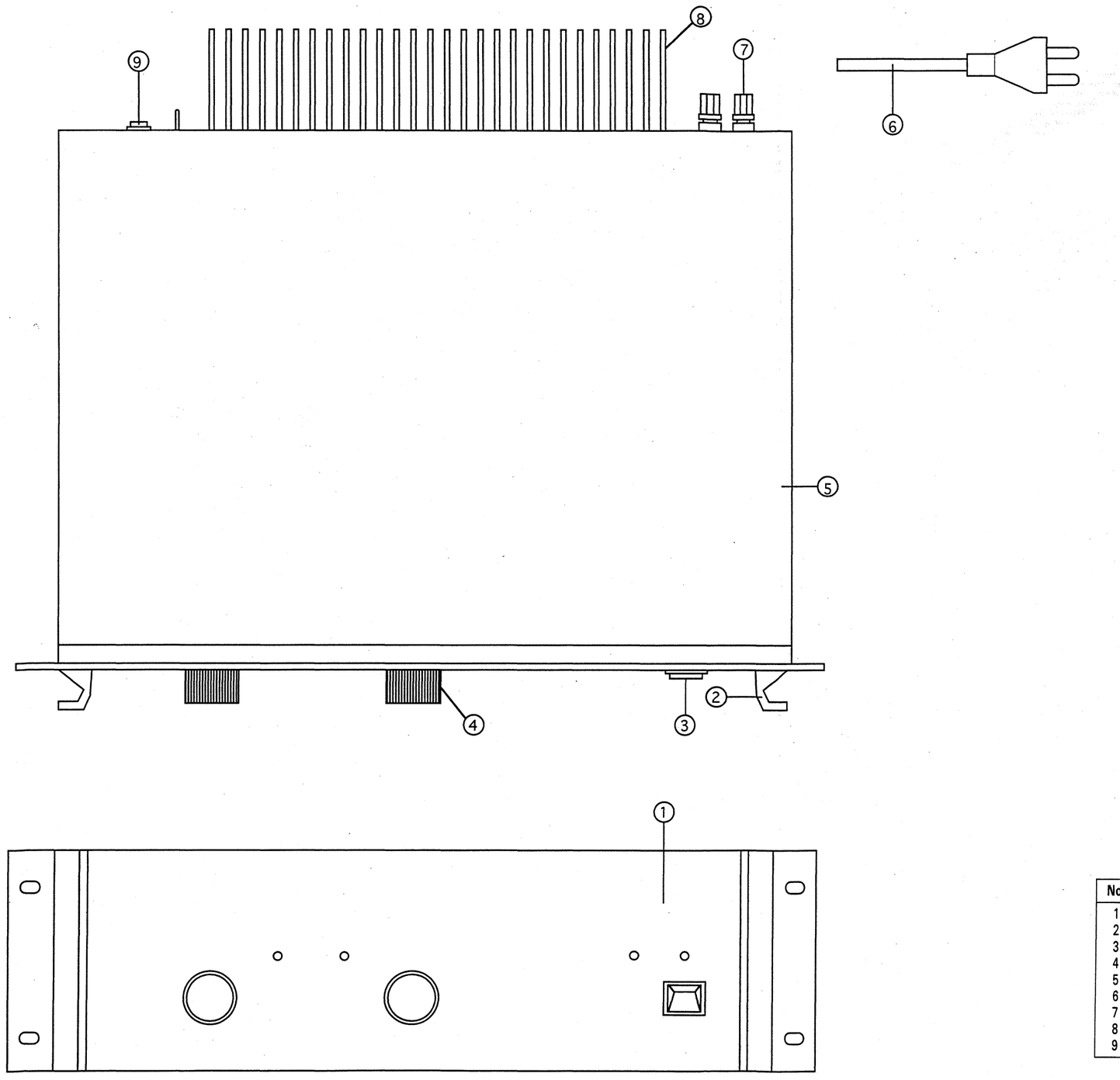
B) ALL SOLDERING MUST BE DONE IN A PROFESSIONAL MANNER USING SOLDER WHITE RESINE CORE ONLY
C) ALL COVERS , SHIELD AND INSULATING SPACERS MUST BE REPLACED BEFORE RETURNING APPLIANCE TO CUSTOMER
D) A DAMAGE POWER SUPPLY CORD MUST BE REPLACED BEFORE RETURNING TO CUSTOMER
E) DIELECTRIC TEST CONSISTING OF 1200V AC 60Hz IS TO BE APPLIED BETWEEN BOTH BLADES OF THE POWER SUPPLY CORD ATTACHMENT PLUG THE EXPOSE CONDUCTIVE SURFACE OF THE APPLIANCE FOR A PERIOD OF NOT LESS THAN ONE SECOND BEFORE RETURNING APPLIANCE TO CUSTOMER
F) THE -S-W-E- MARKED RESISTORS ARE MOUNTED THE P C B ON SLEEVES.

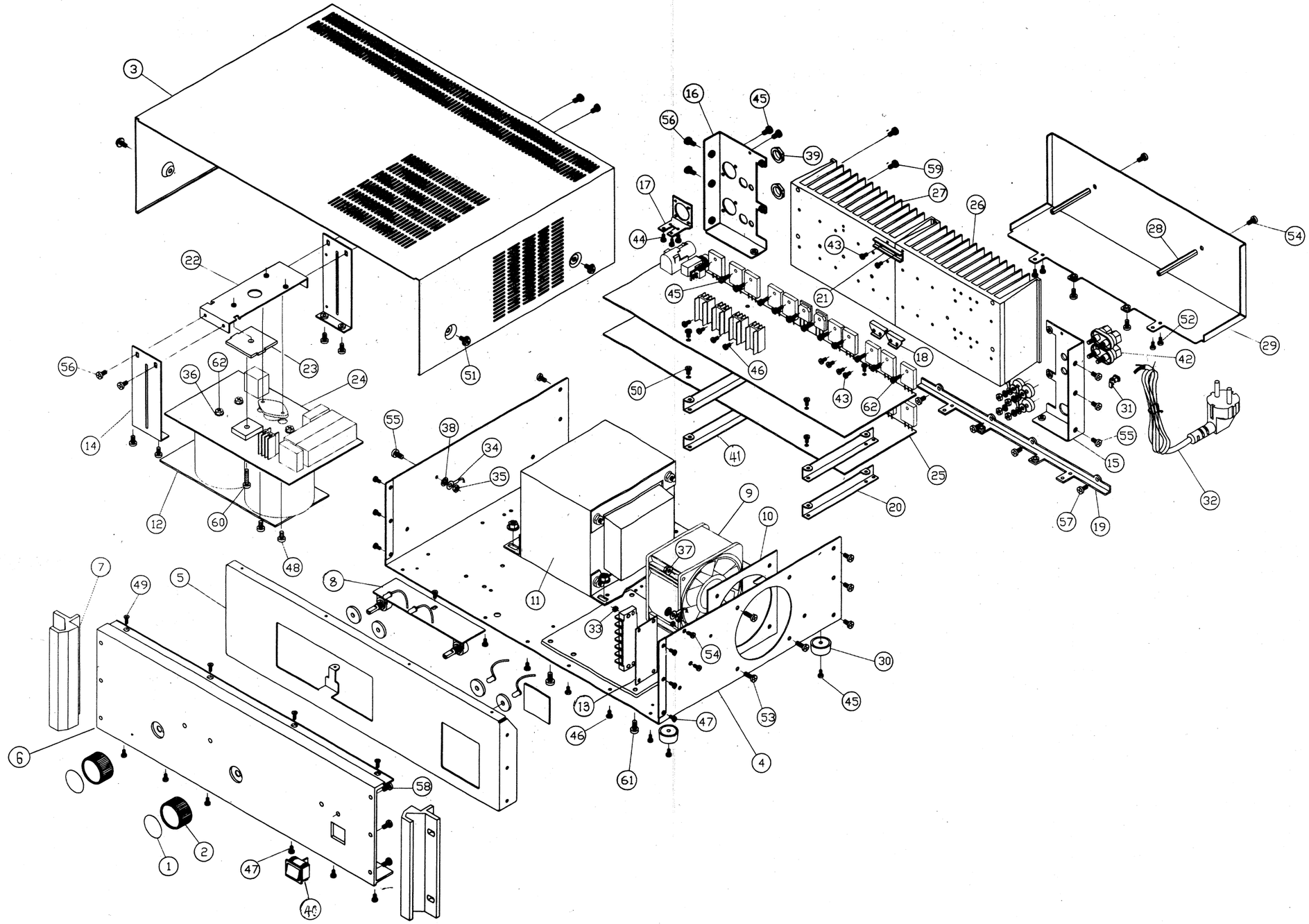
NOTE : Q308 : KTD 880Y
Q101 - Q104, Q112, Q301 - Q307, Q501, Q502 : KTC 2240BL
Q127, Q128 : KTA 970 BL
Q109 - Q111 : KTD1302
Q105, Q106 : KTA 968 Y
Q107, Q108 : KTC 2238 Y
Q113, Q117 - Q121 : 2SC 3856Y
Q114, Q122 - Q126 : 2SA1492Y
D101, D102 : UPZ - 15 BM
D103, D104 : IN 60
D105 - D108 : CD624
D402, D405 : UZ - 24 BM
D403, D404, D406 : IN 4004

Exploded View of Cabinet & Chassis (MA-920)

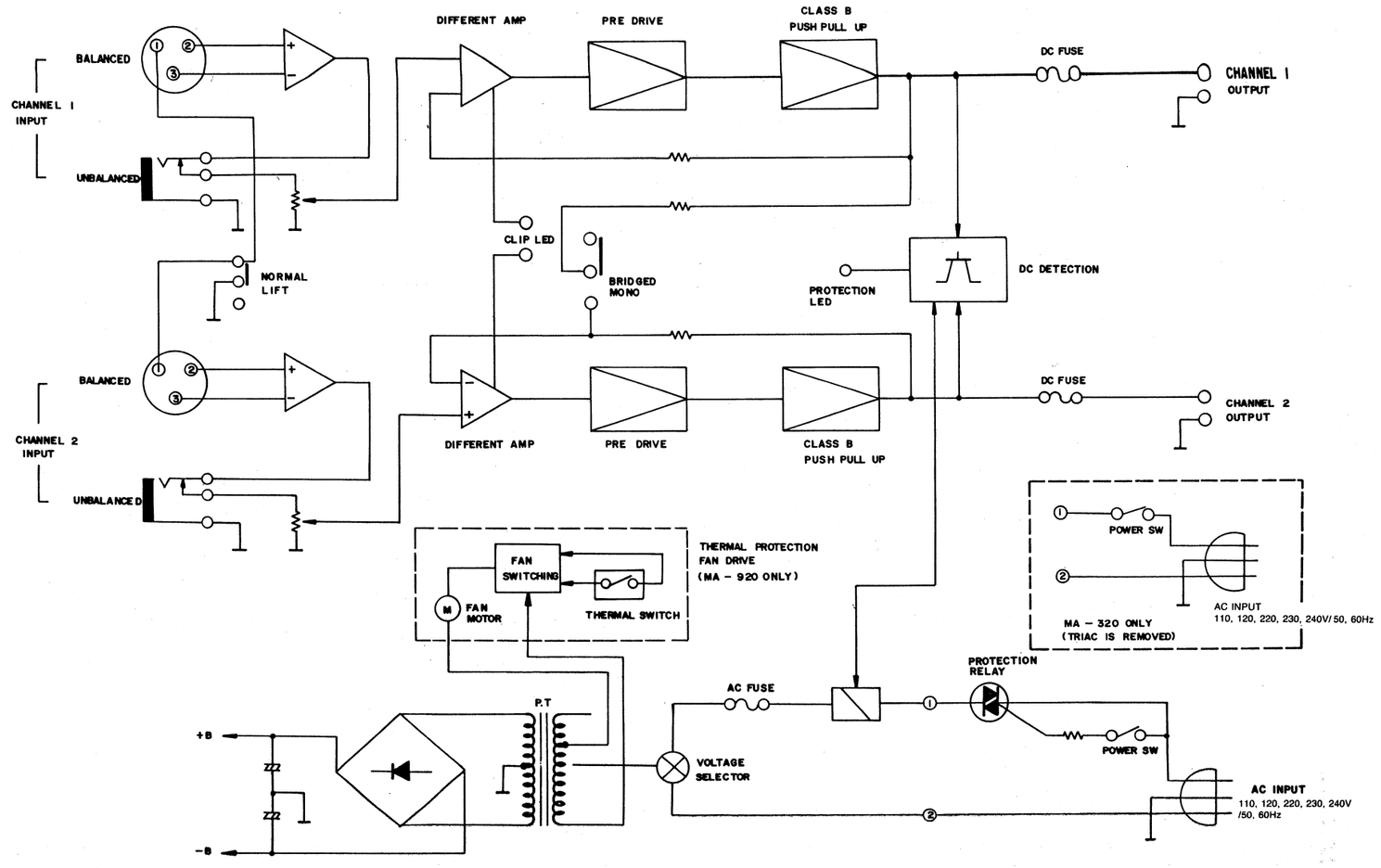


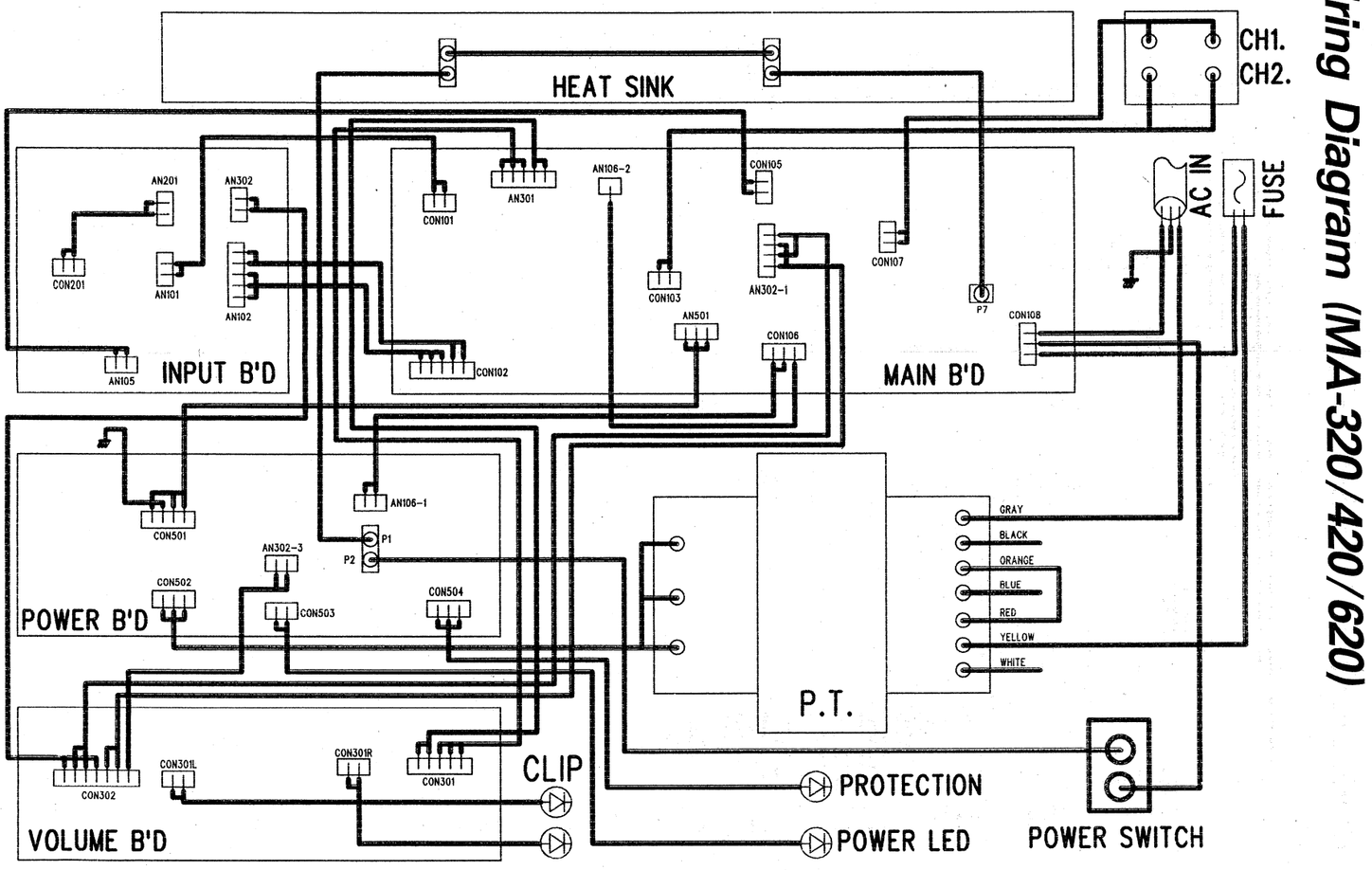
No.	Description	Part No.	Remarks
1	FRONT PANEL	048602991612	1
2	HANDLE 3H	048603999301	2
3	SW POWER	4625999410	1
4	KNOB CONTROL	8525999510	2
5	TOP COVER	046121098020	1
6	CORD AC	430899910	1
7	TERMINAL ASS'Y 2P	4408198610	2
8	HEAT SINK	046123498510	2
9	PHONE JACK	4438098910	2

Exploded View of Cabinet & Chassis (MA-920)



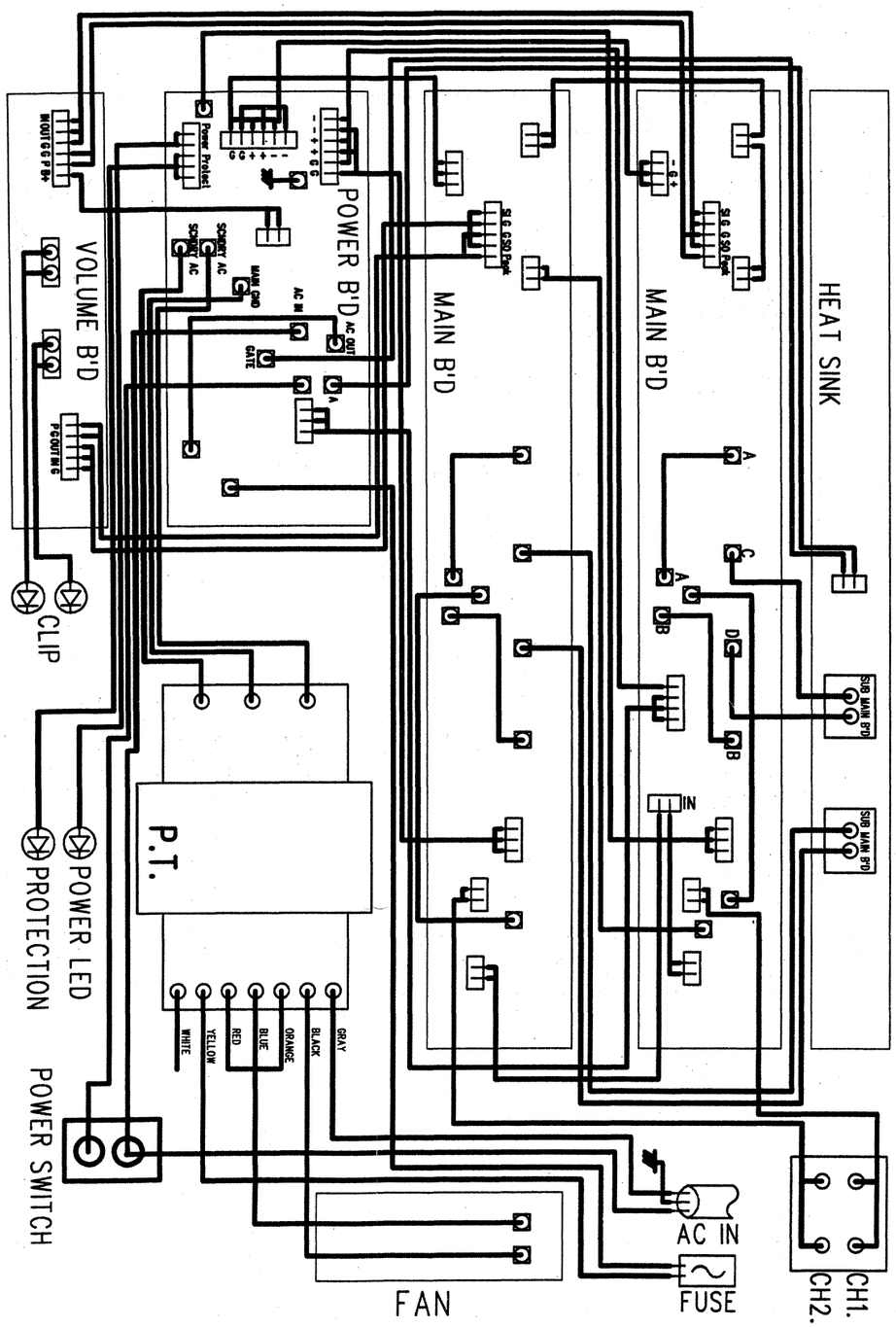
Block Diagram (MA-320/420/620/920)





Wiring Diagram (MA-320/420/620)

Wiring Diagram (MA-920)



Notes